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# JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL,

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“It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away, if they shall entirely cease.”—

SIR WM. JONES.

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1859.





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JOURNAL  
OF THE  
ASIATIC SOCIETY.

No. III. 1858.

*The Great Indian Arc of Meridian, and the Figure of the Earth.—*  
*By the Venerable Archdeacon PRATT, M. A.*

*To the Editor of the Asiatic Journal.*

SIR,—It is not many days since I had the opportunity of seeing for the first time the Notices of the Royal Astronomical Society for January 9, 1857, which contain a paper with the following title, "*An Examination of the Figure of the Indian Meridian as deduced by Archdeacon Pratt from the two Northern Indian Arcs; with a Proposition for testing that form by Astronomical Observations.* By Lieut. J. F. Tennant, Bengal Engineers, F. R. A. S. and First Assistant in the G. T. Survey of India:—" and also a continuation of that paper read before the Astronomical Society in June of last year by the same author. The calculation here referred to by Mr. Tennant was made by me while at the Cape of Good Hope in 1854, and is published in the Philosophical Transactions of the Royal Society for the following year. As the calculations and results of that paper have in some respects not been understood by Mr. Tennant, and as the subject is one which appertains to this country, and interests some of your readers, I hope you may not find it inconvenient to insert this letter in your Journal.

*Preliminary Remarks on the Figure of the Earth.*

2.—It will be necessary to preface what I have to say with a few remarks regarding the Figure of the Earth. After it was known  
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that the earth is of a globular form, Newton was the first who demonstrated that it is not a perfect sphere. From theoretical considerations, and also from the discovery that a pendulum moves slower at the equator than in higher latitudes, he arrived at the conclusion that its form is that of an oblate spheroid. Modern science has confirmed this, and in several ways determined the depression of the pole to a considerable degree of minuteness; and this is looked upon as well established, because the amount of depression, though determined in ways quite independent of each other, is very nearly the same in all. (1.) Upon the hypothesis that the earth was once fluid, and by assuming a (very probable) law of density of its mass, the depression has been found to be 1-300th part of the radius at the equator. (2.) By pendulum-experiments made in many parts of the earth, the determination is 1-288th part. (3.) From the effect of the protuberant parts of the earth's mass on the motion of the Moon in latitude and longitude, Laplace made the depression very slightly less than 1-300th. (4.) By the measurement of arcs of the meridian in different parts of the world and the latitudes of their extremities, and comparing arcs in high latitudes with arcs in low latitudes (which has always been considered necessary to eliminate certain errors of observation), the depression has been found to be slightly less than 1-300th of the equatorial radius. These are so nearly alike that the question has been considered settled, that the earth's figure is an oblate spheroid, and that its ellipticity is 1-300th. To be sure we see mountains and valleys, and table-lands and oceans, and every kind of surface. But these have been compared for insignificance to the unevennesses on the coat of an orange, and are indeed still more trifling in comparison.

3.—But both Physical and Practical Geology have brought new ideas to light. Though the earth no doubt was once fluid, it must be countless ages since it was so. The crust, if the mass be not solid to the centre, is of great thickness, as the only real calculations on the subject—those by Mr. Hopkins of Cambridge—show. It is discovered that the earth does not, though solid, preserve an invariable form. It is a well established fact that in some parts its surface is at present undergoing slow depression, while other parts



are rising, and that this alternate action has been going on for ages. The huge mass appears like a gigantic monster heaving its ribs and then drawing them in again, but with a deliberation which can be measured only by something like astronomical or rather geological periods, and through spaces, though minute, yet sufficiently sensible to destroy the symmetry of its form.

4.—It is therefore perfectly gratuitous to assume as has generally been done, that the form of the earth is now an exact spheroid. And when we look back to the methods which have been used with such success to determine the degree of oblateness, it will be observed that they all of them regard the earth as a *whole*, and take no account of its separate parts. Indeed, as I have already intimated, it has long been an acknowledged fact, that the 4th method fails when arcs near each other, and therefore appertaining to any one portion of the earth's surface alone, are compared; and, I believe myself, chiefly for this reason, that the earth's form is not an exact spheroid. The spheroid (of depression 1-300th) which has been determined by these four methods is, therefore, the *average* spheroid; or the spheroid which more nearly represents the earth's irregular form than any other spheroid; some parts being slightly above it, and some slightly below it, owing to the irregularities which have arisen since the earth ceased to be a fluid mass. We can no longer assume that the arcs of meridian are all equal ellipses, or are ellipses at all, or that the arcs of longitude are circular.

*Remarks on Mr. Tennant's Papers.*

5.—To ascertain the actual form of the different parts of the surface, each part must undergo a separate examination; as the form, though nearly spheroidal, is not exactly so and follows no known law. When we wish to measure the curvature of a curve not differing much from a circle, it is convenient to compare it with the ellipse which most nearly approaches it in form, as the ellipse is the next simplest curve to the circle. Any arc of meridian drawn upon the surface of the earth departs but little from a circle, and may therefore be thus compared. In this comparison, for convenience' sake, the ellipse is so chosen as to have its centre in the centre of the earth and one of its axes coincident with the earth's

axis. The sole quantities, therefore, to be determined are the semi-major axis, and the ellipticity or compression. In the Problem of the Figure of the Earth, the ellipse is a convenient curve of comparison for this further reason, that it was the *exact* form of each meridian when the earth was fluid, or sufficiently fluid to control the external figure.

One of the results of my paper in the Philosophical Transactions of 1855 is the comparison of the curvature of the great arc in India, 800 miles long, lying between Kaliaua (latitude  $29^{\circ} 30' 48''$ ) and Damargida (latitude  $18^{\circ} 3' 15''$ ); and I find that it coincides most nearly with an ellipse of which the compression is 1.426th; and not 1.300th, the compression of the average meridian—that is, if no cause can be discovered counteracting the attraction of the Himalaya mountains.

6.—Mr. Tennant's object, as announced in the heading of his first paper,\* is to *test* this result. But how does he test it? He there proceeds, not to examine my arc, and test it by some other

\* I am indebted to Mr. Tennant for having detected a numerical error in p. 98 of my paper.

For  $\alpha = -0.0059737 - 0.0051426 u + 0.0016881 v$ .

Read  $\alpha = -0.0019203 + 0.0059576 u - 0.0014564 v$ . This will change the value of  $\alpha$  ( $1 + \alpha$ ) in the next line but one.

In the last page I have also detected an error. The formula for the height of the middle point of a small elliptic arc above its chord is correct as there given. But I should not have left it in terms of  $\lambda$ , the amplitude, but of  $s$ , the length of the arc; as  $\lambda$  is not the same, whereas  $s$  is, in the three cases to which the formula is applied. This change will make the height above the chord

$$= \frac{s^2}{8a} \left\{ 1 + \epsilon \left( \frac{1}{2} + \frac{3}{2} \cos 2\mu \right) \right\} = 20 (1 + 1.512 \epsilon) \text{ miles, the same as}$$

before excepting the *sign* of  $\epsilon$ .

The result of this is, that my arc is *flatter* by 157 feet in the sagitta and the arc when mountain attraction is neglected is *more curved* by 281 feet, than the mean curvature.

These corrections have no effect upon the results of my paper. It is possible that there may be other numerical errors, for when the paper was written I was away from all means of employing a computer, as is usual in such cases, to verify the long numerical calculations, not one-tenth of which appears in what is printed. I feel convinced, however, that there is no material error: for I used every precaution I could, and applied every test. The errors mentioned above

method; but to compare it with *other* arcs, and to see whether they are curved so as to belong to one and the same spheroid with mine. One arc he compares it with, runs westward from Kulanpur to Kurachi; the other is a prolongation of the great arc southward from Damargida to Punnæ (latitude  $8^{\circ} 9' 32''$ ). The only question, therefore, which he can solve is, whether his arcs and mine belong or not to one spheroid; not, whether my calculation is right or not. In fact, his process goes wholly upon the gratuitous hypothesis, that all arcs wherever measured belong to one and the same spheroid; that is, that every meridian is an ellipse, and all meridians the same ellipse, and that every arc of longitude is circular. It is a noticeable coincidence, and by no means unfavorable to my calculation, that he finds that the curvature of the arc from Damargida to Punnæ (the prolongation of my arc) coincides more nearly with my ellipse than with the average one. Further on, in his first paper, Mr. Tennant applies a third test, viz. the comparison of the computed and observed azimuth of Kulanpur and Kurachi. But the same objection applies to this also. In fact Mr. Tennant's calculations do not affect my arc; and simply because he has not examined that arc, nor gone through my calculations.

7. There are other indications that Mr. Tennant has mistaken the subject. For example (art. 13) "the attraction is so enormous, if Mr. Pratt's values hold good, near the mountains ....." But I particularly specify, and the whole line of reasoning shows, that my calculation does *not* apply to such places (see p. 66, note, of my paper): and in the continuation of the note in the next three pages I point out a method for such places in and near the mountains: so that the wish expressed by Mr. Tennant in par. 17 was met in

occur at the close, and not in any important place, at least important for my results, but in a kind of corollary.

With reference to paragraph 3 of Mr. Tennant's second paper, I would here observe, that, in the application of the above formula, the three arcs are brought to chords in the same line and the sagittæ compared, merely as a piece of geometry, without any reference to the manner in which they lie and cut each other in the Problem of the Figure of the Earth. The object is simply to compare the degrees of bending between the two extremities, in the three cases, as indeed I state in the paper; and the result is given above.

the paper before him—"If an estimate of the attraction at Benog [in the mountains] could be made ..... ." Then in Mr. Tennant's second paper there are other expressions which show the same bias. He says "He [Mr. Pratt] has failed in satisfying the geodesical data of the great Longitudinal Series." But I did not make the attempt. Mr. Tennant must mean that on applying my results to the great longitudinal series, he failed to show that they tally, on the supposition that the earth's figure is a perfect spheroid. This is what I should have expected: and quite confirms my general view. He says further on, "It [the ellipticity I deduce for the great arc of 800 miles long] is useless for geodesical purposes." Of course it is, if the geodesical operations are carried on with an assumed, and most probably wrong, ellipticity. If the *mean* ellipticity be not the right one, then not *that* ellipticity, but some other, ought to be used in computing the latitudes of places in the neighbourhood of the arc, otherwise the geodesical operations of the Great Survey will be "useless" for the purpose of attaining to that accuracy which the survey is expected to attain. I need not quote other passages. I have read through both Mr. Tennant's papers and his interesting calculations with great care. They cannot disprove the results of my paper for the reason I have mentioned. The only way will be to point out *where* my calculations are wrong, or to show that some other cause is in operation which nullifies the mountain attraction. One other expression only I will notice, as it convinces me, that Mr. Tennant will never clear up the discrepancies while he takes his present view. He speaks of my "hypothetical attractions." Now the only *hypotheses* my calculation of the attraction goes upon are, (1) that the Himalaya Mountains exist, and (2) that each particle of them attracts according to the law of universal gravitation. The amount of this attraction is a matter of calculation; and to determine this was the primary object of my paper in the Philosophical Transactions. The calculation is there printed, and has been before the public for three years. It is impossible to ignore either the existence or the attraction of this enormous mass. It is possible to show that some other cause exists, to *counteract* this disturbing cause. It is also possible to show that the *amount* I have deduced is wrong; because I may

have made mistakes in the arithmetic, or the data regarding the heights of the different parts of the mass may be wrong. But *there* is the calculation, open to inspection, examination, and correction. I can only say, that when I arrived at my result (in 1854) I was very much disappointed that it did not tally with the Great Survey: and I tried every method (see articles 44 to 46 of my paper) to make it do so: but could not succeed. And even now, if no counteracting cause can be discovered to nullify the effect of attraction, I should be very glad, for the sake of saving trouble to the Survey operations, if the amount I arrive at could be shown to be wrong. But it must be, not by the application of tests based upon gratuitous assumptions, nor by any ulterior difficulties which the large amount of attraction may appear to lead to; but by an examination of the calculation itself, showing that the data of heights are so much out, or the arithmetical operations so far erroneous, as materially to affect the result.

8. One of Mr. Tennant's calculations in his second paper serves to show the necessity of calculating and allowing for mountain attraction. The diagram in the next page will illustrate this.  $ABC$  is the actual arc of the meridian running through the three stations Kuliana, Kulanpur, and Damargida.  $Aa$ ,  $Bb$ ,  $Cc$  are the normals to this arc at those three places, and therefore the directions in which the plumb-line would hang were there no disturbing cause. A disturbing cause exists in the enormous mass  $II$  of the Himalayan mountains which attracts the bob of the plumb-line so as to make it hang in the lines  $a'A$ ,  $b'B$ ,  $c'C$  making the angles of deflexion  $aAa'$ ,  $bBb'$ ,  $cCc'$ . These angles are smaller the further removed the station is from  $II$ . The spirit-level, the levelling of the astronomical instruments—every thing regulated by gravity—is affected by this disturbing cause. And the cause, owing to the enormous mass of attracting matter, has its influence, unlike other local and minor disturbing causes, along the whole line of the arc though in a diminishing degree. This the calculation shows.

If we were to proceed from  $C$  and move northwards, laying down a horizontal line by means of a spirit-level (as in laying down a base-line), we should find ourselves gradually rising above the arc  $CBA$ ; we should be obliged to stilt up the spirit-level, till over  $B$

## Remarks.

$ABC$  is the actual arc of the meridian.

$A$  is Kuliiana in lat.  $29^{\circ} 30' 48''$ .

$B$  is Kuliampur in lat.  $24^{\circ} 7' 11''$ .

$C$  is Damargida in lat.  $18^{\circ} 3' 15''$ .

$HI$  is the mass of the Himalayas.

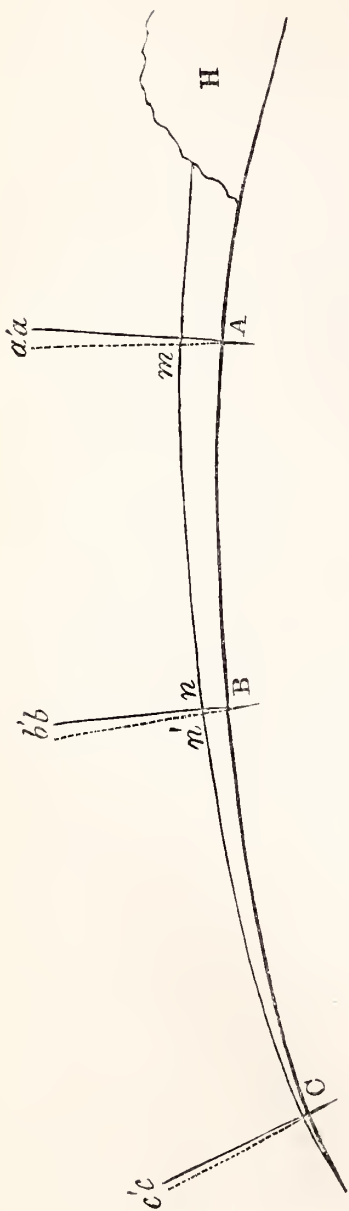
$Aa$ ,  $Bb$ ,  $Cc$  are normals to the arc  $ABC$ , or the lines in which the plumb-line would hang if the Himalayas did not attract.

$Aa'$ ,  $Bb'$ ,  $Cc'$  are the actual plumb-lines, inclined to the above, owing to attraction.

In my paper in the Philosophical Transactions of 1855, the following are the results of attraction

$$\angle aAa' = 27''.853, \angle bBb' = 11''.968 \quad \angle cCc' = 6''.909.$$

$Cnm$  is the curve drawn from Damargida which cuts all the actual plumb-lines at the stations on the arc at right angles.





it had attained the height  $Bn = 99$  feet, and over  $A$  the height  $Am = 271$  feet—these being the heights found by Mr. Tennant on using my formula of attraction.  $Cnm$  (and not  $CBA$ ) is the curve along which the spirit-level would move, as this is the curve which cuts all the plumb-lines at right angles. In ordinary cases the curve which cuts the plumb-lines at all stations on the meridian at right angles is the curve of the arc. This would be the case in this instance also, were it not for  $H$ . If  $H$  did not exist,  $Cnm$  would coincide with  $CBA$ . Now if mountain-attraction is not taken account of, it is the same as supposing that  $H$  does not exist: in which case while the calculation of the Great Survey is being made in reality (because  $H$  does exist) for  $Cnm$ , the calculators imagine they are making it for  $CBA$ . They come to some station,  $B$  suppose, on the arc itself, having well calculated the distance from  $C$ ; they apply the spirit-level, find that  $Bb'$  is the vertical, and think that  $CB$  is the arc they have calculated in fathoms, whereas it is  $Cn'$ , that arc along the upper curve which comes to the same plumb-line. This arc is shorter than  $CB$  by  $nn'$ ; and therefore by that quantity is  $B$  placed in the map too much north, in consequence of neglecting mountain-attraction. And this is an error wholly independent of the particular curvature of the meridian and therefore it affords an additional argument to show the necessity of calculating and allowing for deflexion.

9. Mr. Tennant's next calculation shows that the effect of even much smaller masses than the Himalayas may be of importance and may disturb the local form of the curve cutting the plumb-lines at right angles, which, as I have said, is the curve to which the Great Survey calculations refer. The derangements of the curve may be only local in this case; but if any one or more of the stations used for finding the astronomical amplitude be situated in these localities, the effect may be of serious importance. The effect of these comparatively small masses I have also shown in a paper on the English Arc printed in the Philosophical Transactions for 1856. This only aggravates the uncertainty caused by attraction, and increases the doubtfulness of results arrived at without a complete knowledge of the disturbing causes—at least as far as those results are supposed to have an extreme accuracy.

*On the present position of the question of Himalayan Mountain-Attraction, as affecting the Great Trigonometrical Survey.*

10. I will conclude this letter with some remarks on this subject. The average form of the earth has been already determined with so much precision, that the Great Trigonometrical Survey cannot be expected to improve it. The only new information it can communicate on this subject is, the extent to which the different parts of the Indian continent depart from this average spheroid. This is a matter of no peculiar interest in itself. Unless as a record for comparison in future ages it might be found of use; just as, at present, it would be a matter of interest to know the exact changes of level the surface has gone through in ages past, as these might serve to verify and to fix the chronology of those elevations and sub-mergings of extensive portions of the surface, the evidences of which geologists see in the fossil remains. This, however, is labouring for generations who may never exist.

The real importance of knowing the exact form of Indian arcs is seen in the effect which an erroneous determination of the curvature may have upon that accuracy in the Mapping of the Country which the Great Survey is supposed to ensure.

11. In calculating this curvature, it is absolutely necessary to determine and allow for the effect of mountain-attraction upon the plumb-line in all places where the latitude is observed astronomically. Without this, the curvature cannot be ascertained. I propose now to show this.

If the determinations in the Great Trigonometrical Survey are correct, they must satisfy this test, that the *computed* amplitude of every arc must be precisely equal to the *observed* amplitude. Colonel Everest's work published in 1847 shows that this test is not satisfied, for the great arc, Kaliaana ( $29^{\circ} 30' 48''$ ) to Kalianpur ( $24^{\circ} 7' 11''$ ). His calculations show a discrepancy of  $5''.236$  in the upper portion. In this comparison there are two sources of error which it is necessary to examine—one, in the *computation* of the amplitude; the other, in the astronomical *observation* of the amplitude. For computing the amplitude of an elliptic arc, it is necessary to know (1) the length of the arc, (2) the lati-



tude of the middle point of the arc, and (3) the dimensions of the ellipse of which it is part. The first of these is determined with great accuracy by the survey, and is altogether unaffected by local or mountain-attraction (see pp. 54, 55 of my paper).\* The second, which is not required to any great nicety, is readily found. The third is altogether *assumed*—and here is the first source of error. It has been *assumed* in the Great Trigonometrical Survey that the great arc belongs to an ellipse of which the curvature is that of the average spheroid of the earth. This is not only very far from being certain, but is most probably not the case, as I have shown in my preliminary remarks. Then in the determination of the amplitude by observation, all the elaborate instrumental observations and calculations of the latitudes of the three stations at the extremities and the middle of the arc in question (viz. at Kuliana, Damargida, and Kulianpur near the middle) described by Colonel Everest in his volume are thoroughly to be depended upon. But the instruments are fixed by the *plumb-line*; and therefore any error in this line caused by local or mountain-attraction vitiates the results. Here, then, is the second source of error. Were there only one source of error, the error might be determined by comparing the computed and observed amplitudes. But as this gives only one equation of condition and there are *two* sources of error—and this must be the case for *each* arc, so that no comparison of arcs will help us—we must determine one, at least, of the errors

\* This may appear to be at variance with paragraph 8 above. But the cases are different. The fact is, that the correction there pointed out is after all practically made during the process of the survey; and in this way. Since *B* cannot be seen from *C*, being more than 400 miles off, intermediate stations are chosen for making observations and connecting *B* and *C* by a chain of triangles; and these intermediate stations are down upon the arc *CB*, and not on the arc *Cn*. Of course if the spirit-level were actually used all along, and the stiling process, which would then be necessary, were carried on, this would not be the case. But this course is *not* adopted in the survey; but, to make all the intermediate observations, they come down to the arc *CB*, and begin their curve like *Cn*, as it were, over again at each station; so that the height is not allowed to accumulate to *Bn*, and therefore the projected part of this line is not a correction which must be applied to the length of the arc, as this correction is practically made by the surveyors *piece-meal*, by making their observations from *CB* and not from *Cn*, as they do not adopt stilts.

in some other manner, and then determine the other by the comparison of the amplitudes. I can conceive of no means of finding the curvature of the arc by any independent method: but the other error, the effect of attraction, can be determined by direct calculation, though at first sight a hopeless and in the end a very laborious operation in the case of such a huge and irregular mass as the Himalaya mountains, and not practicable without some such expedient as that which I have called the "Law of Dissection" in the paper in the Philosophical Transactions.

12. The main results of the calculation of attraction in that paper are as follows:—

Deflexion of plumb-line in meridian at Kaliana = 27".853.

Ditto at Kalianpur = 11".968.

Ditto at Damargida = 6".909.

By means of the property of a curve I find the law of meridional deflexion for all stations on this double arc (*but for no other places*) to be

$$\text{Meridional Deflexion} = \frac{114''.712}{L-l + 3.520}$$

$l$  and  $L$  being the latitude, in degrees and parts of a degree, of the proposed station and of Kaliana, the north extremity of the arc. It is the application of these corrections to the astronomical observations, and then the comparison of this corrected astronomical amplitude with the computed amplitude (as described towards the close of para. 11) which brings out the corrected ellipticity  $\frac{1}{4\frac{1}{2}6}$  for this arc, instead of  $\frac{1}{300.8}$ .

13. Mr. Airy in a paper in the Philosophical Transactions for 1855, (p. 101,) states that he was at first very much surprised at the large amount of the deflexion thus discovered. And he goes on to suggest a remedy. But he does not call in question the correctness of my result. He throws out the idea, that there is another cause in operation which counteracts the effect of the attraction; viz. a *deficiency* of attracting matter immediately beneath the mountain mass. Three objections were started to this hypothesis in the postscript to my second paper (on the English Arc), p. 51 of the Transactions for 1856. They are more fully discussed in the Philosophical Magazine for November 1855. No answer has been given

to these objections; and several competent judges have pronounced the hypothesis to be untenable: I therefore regard it as abandoned.

It is in this direction, however, I fully believe, that a counteracting cause is to be found, if there be any, to modify the large disturbing effect of the Himalaya Mountains. I have recently been considering this subject again, and purpose communicating a paper to the Royal Society on the subject shortly, if my hopes are verified by further examination. This cannot, however, diminish the importance of ascertaining the true amount of deflexion from mountain-attraction, as every disturbing cause should be fully examined and estimated.

14. The present position of the problem of Himalayan attraction is this. The data which I assume in the six tables in pages 78 to 83 of the Philosophical Transactions for 1855 should be examined, to see whether the values of  $h$  are tolerably correct representatives of the average heights of the masses standing on the several "compartments" to which they appertain. This the gentlemen of the survey can best do. I have written to Colonel Waugh, the Surveyor General, (who first called my attention to this subject) for corrections of these heights; but, having received no corrections, I conclude the data are rightly assumed.

I am, your obedient servant,

Calcutta, July 6th, 1858.

J. H. PRATT.

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*Bháskará's knowledge of the Differential Calculus.*—By BAPU DEVA SHASTRI, *Professor of Mathematics and Astronomy in the Government Sanskrit College, Benares.*

*To the Editor of the Asiatic Society's Journal.*

SIR,—It appears to be generally believed that the principle of the Differential Calculus was unknown to the ancient Hindu mathematicians. Allow me to correct this impression by the following statement regarding what Bháskaráchárya has written on the subject.

Bhāskarāchārya says that “ the difference between the longitudes of a planet found at any time on a certain day and at the same time on the following day is called its rough motion during that interval of time ; and that its *Tātkaḷika* motion is its exact motion.”

The *Tātkaḷika* or instantaneous motion of a planet is the motion which it would have in a day, had its velocity at any given instant of time remained uniform. This is clear from the meaning of the term *Tātkaḷika* and it is plain enough to those who are acquainted with the principles of the Differential Calculus that this *Tātkaḷika* motion can be no other than the differential of the longitude of a planet. This *Tātkaḷika* motion is determined by Bhāskarāchārya in the following manner.

“ Suppose,  $x, x'$  = the mean longitudes of a planet on two successive days ;

$y, y'$  = the mean anomalies ;

$u, u'$  = the true longitudes and

$a$  = eccentricity or the sine of the greatest equation of the orbit.

Then,  $x' - x$  = the mean motion of the planet,  $y' - y$  = the motion of the mean anomaly and  $u' - u$  = the true motion of the planet.” Now according to Bhāskarāchārya, the equation of the orbit on the

$$\text{first day} = \frac{a \cdot \sin y}{\text{Rad}}, \text{ and}$$

$$\text{that on the next day} = \frac{a \sin y'}{\text{Rad}} ;$$

$$\therefore u = x \pm \frac{a \cdot \sin y}{\text{Rad}}, \dots \dots \dots (1).$$

$$\text{and } u' = x' \pm \frac{a \cdot \sin y'}{\text{Rad}} ;$$

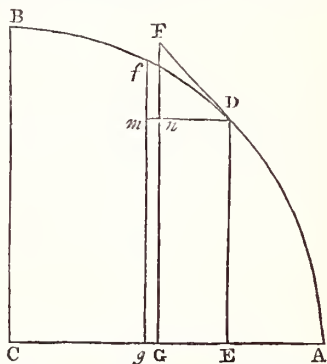
$$\therefore u' - u = x' - x \pm \frac{a (\sin y' - \sin y)}{\text{Rad}} \dots \dots (2).$$

Now, in order to know the instantaneous value of  $u' - u$ , it is necessary first to know the instantaneous value of the *Bhogyakhandā* or the difference between two successive sines given in *Tables of sines*. Thus, suppose the sines of the arcs  $0, A, 2A, 3A, \&c.$  are given in the *Tables of sines*, then

$\sin A - \sin 0$ ,  $\sin 2A - \sin A$ ,  $\sin 3A - \sin 2A$ , &c. are the *Bhogya-khandas*.

“These are not equal to each other but gradually decrease, and consequently while the increase of the arc is uniform, the increment of the sine varies”—on account of the deflection of the arc. Hence the difference between any two successive sines is not the *Tātkālika Bhogya-khaṇḍa*; but if the arc instead of being deflected be increased in the direction of the tangent then the increase which would take place in the sine is the *Tātkālika Bhogya-khaṇḍa* i. e. the instantaneous motion of the sine.

Thus, in the accompanying diagram, suppose the arc  $Df = A$ , then,  $\sin Af - \sin AD = fg - DE = fm$ , the *Bhogya-khaṇḍa* of the sine  $DE$ ; but this is not the *Tātkālika Bhogya-khaṇḍa* of that sine. If the arc  $AD$  instead of being deflected towards  $f$ , be increased in the direction of the tangent, so that  $DF = Df = A$ ; then  $FG - DE = Fn$ , which would be the *Tātkālika Bhogya-khaṇḍa* of the sine  $DE$  i. e. the instantaneous motion of that sine.”



Bhāskarāchārya has determined that “the *Tātkālika Bhogya-khaṇḍa* varies as the cosine of arc, i. e. when arc = 0, its cosine equals the radius, and  $A =$  the *Tātkālika Bhogya-khaṇḍa. And, as the arc increases, the cosine and the *Bhogya-khaṇḍa* decrease. Hence, if  $y$  be any given arc, the *Tātkālika Bhogya-khaṇḍa* answering to it will be found by the following proportion.*

- As,  $R$  (or the cosine of an arc = 0.)  
 : The *Tātkālika Bhogya-khaṇḍa* ( $= A$ )  
 :: Cosine  $y$ .  
 : *Tātkālika Bhogya-khaṇḍa* of  $\sin y$ .  
 $\therefore$  *Tātkālika Bhogya-khaṇḍa* =  $\frac{A \cdot \cos y}{R}$ .”

The reason of the above proportion can be easily understood from the two similar triangles  $DCE$  and  $DFn$  in the above diagram.

“After having thus determined the *Tātkaḷika Bhogyā-khāṇḍa*, the instantaneous value of  $\sin y' - \sin y$  is found by the following proportion.

As  $A : \frac{A \cdot \cos y}{R} :: y' - y : \frac{\cos y \times (y' - y)}{R}$  (= the instantaneous value of  $\sin y' - \sin y$ .)

By substituting the instantaneous value of  $\sin y' - \sin y$  in the equation (2), the instantaneous value of  $u' - u$ , the true motion of the planet will be found: that is,

$$u' - u = x' - x \pm \frac{a \cdot \cos y}{R} \cdot \frac{y' - y}{R} \dots\dots (3)$$

This is the instantaneous motion of the planet.”

This is the way in which Bhāskarāchārya determined the instantaneous motion of the sun and the moon.

Equation (3) is just the differential of equation (1). As,

$$d(u) = d\left(x \pm \frac{a \cdot \sin y}{R}\right);$$

$$\text{or } du = dx \pm \frac{a \cdot \cos y}{R} \cdot \frac{dy}{R};$$

which is similar to equation (3).

Now, the term *Tātkaḷika* applied by Bhāskarāchārya to the velocity of a planet, and his method of determining it, correspond exactly to the differential of the longitude of a planet and the way for finding it. Hence it is plain that Bhāskarāchārya was fully acquainted with the principle of the Differential Calculus. The subject, however, was only incidentally and briefly treated of by him; and his followers, not comprehending it fully, have hitherto neglected it entirely.

I have the honor to be,  
Your obedient servant,  
BAPU DEVA SHASTRI,

1th May, 1858.



*Of two Edicts bestowing Land, recorded on plates of copper.—By  
FITZ-EDWARD HALL, M. A.*

The inscriptions here edited in the original Sanskrit, with translations and comments, add little to our previous knowledge of Indian history. The first, however, ascertains a regnal year of one of the kings of Kanoj; and it is now settled, beyond reasonable doubt, that Madanapála Deva was administering this principality in A. D. 1097. The patent which supplies this date is the oldest monument of the kind, emanating from the dynasty of its donor, that has yet been discovered.

The names of the sovereigns in question, and one or more of the years during which the last four of them are known to have borne rule, shall, first of all, be enumerated, on the authority of grants similar to those which are to follow.

1. Yas'ovigraha.\*
2. Maháchandra.

\* Colebrooke calls this prince, S'ripála; but on insufficient authority. See *Miscell. Essays*, Vol. II., pp. 286 and 294.

A crude note on this point will be found in this *Journal*, for 1841, p. 98. Neither had Dr. Mill nor had any one else pretended—unless it was Colebrooke, and he only by his silence—the identity, other than ordinal, of S'ripála and Yas'ovigraha.

The writer of the note referred to was, further, unaware of Capt. Fell's remarks on Colebrooke, and likewise of Colebrooke's acknowledgment that he had confounded Vijayachandra with Jayachandra. Mr. Torrens also mistakes in naming the work, and the volume of it, from which he gives an extract.

In the Khaira inscription, which has been partially deciphered, first by Colebrooke, and afterwards by Mr. James Prinsep, occurs the name of King Yas'ópála. See *Miscell. Essays*, Vol. II., pp. 277 and 278; and this *Journal* for 1836, p. 731. Capt. Fell asks: "Is he the same with Yas'ovigraha?" *As. Res.*, Vol. XV., p. 453. To Prof. Wilson it "seems not improbable" that he was. *Ibid.*, Vol. XV., p. 462. Dr. Mill thinks that the Vighraha of the Shekhávátí inscription is, very likely, the Yas'ovigraha of the Kanoj dynasty. *Journal of the As. Soc. of Bengal*, for 1835, pp. 369 and 392. These opinions, though they have not been proved erroneous, still await substantiation.

Another Vighraha has come to light since Dr. Mill wrote as above cited. His time, which was not long prior to 1042, might assist an hypothesis that he was

3. Chandra Deva.\* A. D.
4. Madanapála Deva. 1097.†
5. Govindachandra Deva. 1120‡ and 1125.§ A. D.
6. Vijayachandra Deva. 1163.||
7. Jayachandra Deva. 1177, 1179,¶ and 1186.\*

With Jayachandra, who died about 1193, his dynasty closes; at least so far as concerns Kanoj. But this prince, it should appear, left an heir, whose son, S'ivájí, only seventeen years after the death of his grandsire, attracts attention as the first Rájá of Jodhpur.† The father of S'ivájí, the only link required to connect him with Jayachandra, was S'wetáráya; if dependence may be placed on the pedigree‡ of the chiefs of Márwád, here appended.

one with Yas'ovighraha. But it appears as if he died childless; and mention is wanting that he adopted an heir. Journal of the As. Soc. of Bengal, for 1841, pp. 668 seq.

If the Vighraha of the inscriptions at Old Delhi is the same with the Vísala whom they record, his era was as late as 1163; and he was contemporary with Vijayachandra of Kanoj.

\* Prof. Wilson, on the latest occasion of his recapitulating the rulers of the family in discussion, inadvertently reduces them from seven to six, besides converting Mahíchandra into Mahípála. The individual omitted is Chandra Deva, the first person in his line, of any recognised importance. It was he that conquered Kanoj; and we have yet to learn that his ancestors, Yas'ovighraha and Mahíchandra, were persons of regal rank. See Ariana Antiqua, p. 435.

† See the first of the ensuing inscriptions.

‡ See the As. Res., Vol. XV., p. 447.

§ See the latter of the inscriptions in this paper.

|| See Colebrooke's Miscell. Essays, Vol. II., p. 286.

The Táráchándí inscription, which is dated in the *Samvat* year corresponding to A. D. 1172, refers to Vijayachandra by name and title. It is not clear, however, from this memorial, whether he, or his son, was reigning at that time. Most probably it was the son: and it is positive that it was he, if we may credit the Márwád chronicles; as they place the death of Vijayachandra in 1168. See Colebrooke's Miscell. Essays, Vol. II., pp. 289, 295, and 296. Also Journal of the As. Soc. of Bengal, for 1834, pp. 341 and 342.

¶ For the first two dates see the As. Res., Vol. XV., pp. 446, 447, 450 and 460.

\* See Journal of the As. Soc. of Bengal, for 1841, pp. 98, 100 and 103.

† In A. D. 1210. Useful Tables, Part the Second, p. 111; after Col. Tod.

‡ In eleven Sanskrit couplets; for a copy of which, as of his own composing,



S'weta-ráya.

1. S'ivájí\* Ráva, or S'ivájí R. ; father of
2. A'sthána Ráva, father of
3. Dhúḍaji, father of
4. Ráya-pála, father of
5. Jálana,† father of
6. Tíḍojí.
7. Chhádójí Ráva,‡ father of
8. Salashaṇa, or Salakshaṇa ; father of
9. Víramjí, or Vírají ; father of
10. Chúḍojí.
11. Ríḍa Malla,§ father of
12. Jodojí,|| or Yoddhájí ; father of
13. Sújojí Ráva, father of
14. Vághojí,¶ or Vyághrají.
15. Gángojí Ráva, or Gángeya R. ; father of
16. Mála Deva.\*

I am indebted to a Bráhmaṇ who gave himself out to be the family-priest of the present Rájá of Jodhpur. This man I saw at Ajmere, about a year ago. The verses, at their conclusion, claim, for their author, one Dayáráma.

\* Described as श्वेतरायकुले जातः । If S'ivájí was grandson of Vijayachandra, and son of S'wetaráya, the word *kula* must be understood as implying paternity. S'weta-ráya little resembles a gentile appellation.

S'ivájí is the reading of the original. I have annexed the more classical form ; and so of many of the names in this catalogue. Relationship, where intimated in the Sanskrit, is also specified in the English.

† Mr. Prinsep interposes " Kanhul" between Ráyapála and Jálana.

‡ " Chado" comes first, according to Mr. Prinsep ; and then " Thedo." The original might be taken as designing these two names for one and the same person :

तोडोजी तत्सुतो ज्ञेयः खाडोजीरावसञ्जकः ।

§ The same sort of doubt as that expressed in the last note, here offers. The Sanskrit is :

चूडोजी तत्सुतो जात रीडमहेति सञ्जकः ।

|| The founder of Jodhpur : जोधपत्तनकारकः । The *Baghela-vans'a-charita* has Yodhpura.

¶ This name is omitted by Mr. Prinsep.

\* Mánavati,—daughter of Malla-ráya, son of Mála Deva,—married Vírabhadra, prince royal of Boghelkhand, in the *Samvat* year 1616, or A. D. 1559. See

17. Udai Sinha ; or Udaya S. ; father of
18. S'úra Sinha, father of
19. Gaja Sinha, father of
20. Jaswanta, or Yas'aswat, father of
21. Ajita Sinha,\* father of
22. Bagat Sinha, or Bakht† S. ; father of
23. Vijaya Sinha, father of
24. Gumána Sinha,‡ or Gumán S. ; father of
25. Mána Sinha, father of
26. Tagat Sinha, or Takht S. ; now ruling.

The more ancient of the two inscriptions under notice was examined, by me, at Benares. It is, I believe, the property of Major R. R. W. Ellis. Of its history I know nothing. A copy is sub-joined.

## स्वस्ति ।

अकुण्ठोत्कण्ठवैकुण्ठकण्ठपीठलुठत्करः ।

संरम्भः सुरतारम्भे स श्रियः श्रेयसेऽस्तु वः ॥ १ ॥

आसीदश्रीतद्युतिवंशजातस्त्र्यापालमालासु दिवं गतासु ।

साक्षाद् विवस्वानिव भूरिधाम्ना नाम्ना यशोविग्रह इत्युदारः ॥ २ ॥

तत्सुतोऽभून् महीचन्द्रश्चन्द्रधामनिभं निजम् ।

येनाऽपारमकूपारपारे व्यापारितं यशः ॥ ३ ॥

तस्याऽभूत् तनयो नयैकरसिकः क्रान्तद्विषन्मण्डलो

विध्वस्तोद्धतवीरयोधतिमिरः श्रीचन्द्रदेवो नृपः ।

येनोदारतरप्रतापशमिताशेषप्रजोपद्रवं

श्रीमद्राधिपुराधिराज्यमसमं दोर्विक्रमेणाऽर्जितम् ॥ ४ ॥

the *Baghela-vans'a-charita*, by Kankana, son of A's'aditya ; 17th chapter, s'l. 62 and 63.

\* Called ' a renowned exterminator in the utter destruction of Muhammadans :'  
यवनप्रलये ध्वंसकारकस्तु विशारदः ।

† Before Bakht Sinha's name, Mr. Prinsep inserts two princes, Abhaya Sinha and Ráma Sinha, whom our genealogist omits. The first, at least, as being a parricide, brought no credit to his family. Bakht Sinha is spoken of as " captor of the chief of the Kachchhapas :'  
कच्छपेन्द्रापहारकः ।

‡ Mr. Prinsep has Bhíma Sinha.

तीर्थानि काशिकुशिकोत्तरकोशलैन्द्र-  
स्थानीयकानि परिपालयताऽभिगम्य ।  
हेमात्मतुल्यमनिशं ददता द्विजेभ्यो  
येनाऽङ्किता वसुमती शतशस्तुलाभिः ॥ ५ ॥  
तस्याऽऽत्मजो मदनपाल इति क्षितीन्द्र-  
चूडामणिर्विजयते निजगोत्रचन्द्रः ।  
यस्याऽभिधेककलशोक्षसितैः पयोभिः  
प्रक्षालितं कलिरजः सकलं धरित्र्याः ॥ ६ ॥  
यस्याऽऽसीद् विजयप्रयाणसमये तुङ्गाचलोच्चैश्चलन्-  
माद्यत्कुम्भिपदक्रमासमभरभ्रश्यन्महीमण्डले ।  
चूडारत्नविभिन्नतालगलितस्थानासृग्गुङ्गासितः  
शेषः पेषवशादिव क्षणमसौ क्रोडे निलीनाननः ॥ ७ ॥

सोऽयं समस्तराजचक्रसंसेवितचरणः परमभट्टारकमहाराजाधि-  
राजपरमेश्वरपरममाहेश्वरनिजभुजोपार्जितश्रीकन्यकुञ्जाधिपत्यश्रीच-  
न्द्रदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वरपरममाहेश्व-  
रश्रीमन्मदनपालदेवो विजयी वणेशरमौअपत्तलायामङ्ग्यामग्रा-  
मनिवासिनो निखिलजानपदानुपगतानपि च राजराज्ञीयवराज-  
मन्त्रिपुरोहितप्रतीहारसेनाधिपतिभाण्डागारिकाक्षपटलिकभिषङ्-  
नैमित्तिकान्तःपुरिकदूतकरितुरगपत्तनाकरस्थानगोकुलाधिकारिपु-  
षान् समाप्तापयति बोधयत्यादिशति च ।

विदितमस्तु भवतां यथोपरिलिखितग्रामः सजलस्थलः सलोहल-  
वणाकरः समधूकचूतवनवाटिकाविटपटण्यूतिगोचरपर्यन्तः सगर्तो-  
षरः सोर्ध्वाधश्चतुराघाटविशुद्धः स्वसीमापर्यन्तश्चतुष्पञ्चाशदधिकश-  
तैकादशसंवत्सरे माघे मासि शुक्लपक्षे तृतीयायां सोमदिने वारा-  
णस्यामुत्तरायणसङ्क्रान्तौ अङ्कतः संवत् ११५४ माघसुदि ३ सोमे  
वाराणस्यां देवश्रीत्रिलोचनघट्टे गङ्गायां स्नात्वा श्रीमद्राजाधिराज-  
श्रीचन्द्रदेवेन विधिवन् मन्त्रदेवमूर्तिमनुजभूतपितृगणांस्तर्पयित्वा  
तिमिरपटलपाटनपटुमहसमुष्णरोचिषमुपस्थायौषधिपतिशकलशेख-  
रं समभ्यर्च्य त्रिभुवनत्रातुर्वासुदेवस्य पूजां विधाय प्रचुरपायसेन  
हविषा हविर्भुजं ज्जत्वा मातापित्रोरात्मनश्च पुण्यशोभिवृद्धये कौ-  
शिकगोत्राय विश्वामित्रौदलदेवरातत्रिप्रवराय कुन्दोगशाखिने ब्रा-

ह्यणदेवस्वामिपौत्राय ब्राह्मणश्रीवाराहस्वामिपुत्राय ब्राह्मणश्रीवा-  
मनस्वामिशर्मणे गोकर्णकुशलतापूतकरतलोदकपूर्वमापन्नसन्नो ह्यह-  
कान्तं यावत् शासनीकृत्य प्रदत्त इति ज्ञात्वाऽऽस्माभिः पितृदानशा-  
सनप्रकाशनार्थं निजनामाङ्कितमुद्रया ताम्रपट्टके निधाय प्रदत्तो मत्वा  
यथादीयमानभागभोगकरहिरण्यप्रभृतिसमस्तादायानाच्चाविधेयीभूय  
दास्यथ ।

### भवन्ति चाऽत्र श्लोकाः ।

भूमिं यः प्रतिगृह्णाति यश्च भूमिं प्रयच्छति ।  
उभौ तौ पुण्यकर्माणौ नियतं स्वर्गगामिनौ ॥ १ ॥  
शङ्खं भद्रासनं कृत्रं वराश्ववरवारणाः ।  
भूमिदानस्य चिह्नानि फलमेतत् पुरन्दर ॥ २ ॥  
सर्वानेतान् भाविनः पार्थिवेन्द्रान्  
भूयो भूयो याचते रामभद्रः ।  
सामान्योऽयं धर्मसेतुर्दृषाणां  
काले काले पालनीयो भवद्भिः ॥ ३ ॥  
बहुभिर्वसुधा भुक्त्वा राजभिः सगरादिभिः ।  
यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् ॥ ४ ॥  
सुवर्णमेकं गामेकां भूमेरप्येकमङ्गुलम् ।  
हरन् नरकमाप्नोति यावदाभतसम्भवम् ॥ ५ ॥  
खदत्तां परदत्तां वा यो हरेत् वसुन्धराम् ।  
स विष्ठायां कृमिभूत्वा पितृभिः सह मज्जति ॥ ६ ॥  
षष्टिं वर्षसहस्राणि स्वर्गे वसति भूमिदः ।  
आच्छेत्ता चानुमन्ता च तान्येव नरकं वसेत् ॥ ७ ॥  
यानीह दत्तानि पुरा नरेन्द्रैर्  
दानानि धर्मार्थयशस्कराणि ।  
निर्माल्यवान्तप्रतिमानि तानि  
को नाम साधुः पुनराददीत ॥ ८ ॥  
वाताभ्रविभ्रममिदं वसुधाधिपत्यम्  
आपातमात्रमधुरा विषयोपभोगाः ।  
प्राणास्तृणायजलबिन्दुसमा नराणां

धर्मः सखा परमहो परलोक्याने ॥ ६ ॥

श्रीमन्मदनदेवेन पितृदानप्रकाशकः ।

शासनस्य निबन्धोऽयं कारितः स्वीयमुद्रया ॥ १० ॥

लिखितं करणिकठकुरश्रीसहदेवेन । शिवमत्र । मङ्गलं महाश्रीः ।  
श्रीमदनपालदेवेन ॥

TRANSLATION.

Well be it!

1. May yours, to *your* prosperity, be that transport which was S'ri's,\* when, in the course of dalliance, her hands wandered over their support, the neck of Vaikuṅṭha, whose desire was *as yet* unsated.

2. The lines of monarchs† sprung from the solar race‡ having attained the celestial abode, there was born *one* Yas'ovigraha, by name; munificent, *and* manifestly comparable with the sun for plenitude of effulgence.

3. His son was Mahíchandra; whose illimitable fame, resembling the lustre of the moon, was spread, by him, beyond the sea.

4. His son was the auspicious king Chandra Deva,§ whose do-

\* S'ri, or Lakshmi, personified abundance, or prosperity, is the wife of Vishnu, here called Vaikuṅṭha.

† The equivocal import of the word rájan and its synonymes, which denote any member of the military class, as well as 'king,' has, doubtless, often stood in good stead to successful Kshatriya adventurers, when commemorating their ancestry, in making it appear as if actual royalty had subsisted in their families as a long-standing heritage. That Yas'ovigraha and Mahíchandra were nothing more than ordinary subjects, is by no means improbable, as has been intimated above.

‡ The word for 'sun,' embodied in the expression here rendered 'solar race,' is, in the original, represented epithetically by a compound signifying 'the not cold-rayed.'

The solar race comprises the first grand division of the martial class.

The translation of Jayachandra's grant, contained in this Journal for 1841, p. 101, &c., is crowded with errors of the grossest ignorance or heedlessness. The general character of the thing may be inferred from its distortion of the stanza to which this note is appended. It runs as follows:—"The Rájás who were descended from the lunar line having departed for heaven, one, named Yas'ovigraha, by his natural spirits was as the sun himself."

§ Colebrooke and Capt. Fell write S'ríchandra Deva. But it seems preferable to regard the syllable *s'ri* as an honorary prefix. See *Miscell. Essays*, Vol. II., p. 286; and *As. Res.*, Vol. XV., p. 449.

minant passion was polity; discomfiter of the bands of his foes; dissipating the gloom produced by the hostile presence of haughty valorous warriors; and through whose most august grandeur was assuaged every hardship of the denizens of the unrivalled realm of Gádhipura\* the famous, which he had acquired by the might of his arm:

5. Who, having repaired, as a protector to the religious resorts at Kás'í,† Kus'ika,‡ North Kos'ala,§ and Indrasthána,|| in bestowing, time after time, his weight in gold¶ on the twice-

\* Gádhipura is the same as Kanyakubja, as will be seen hereafter.

† Kás'í generally intends the city of Benares; but it also designated the neighbouring country. There is ground to believe that, at one time, while this name was more particularly applied to the capital, Váránasí was employed, perhaps exclusively, to distinguish the province. See this Journal, for 1848, Part I., p. 71.

But a custom, the reverse of this, seems to have obtained, at a certain period. See the *Kalpa-druma-kaliká*, by Lakshmi Vallabha, *ad finem*. This work is a commentary on the *Kalpa-sútra* of the Jinas.

The word *váránasí*, said to occur in the *Atharva-veda*, is explained in the *Já-bála Upanishad*, to be the same with the *sushumna*, or coronal artery; and *varana* and *así* are named in defiance of grammar, as its constituents. The first of these is there asserted to be a synonyme of *pingalá*; the second, of *idá*; two tular vessels, according to the reveries of the Yoga.

In the *Kás'í-khaṇḍa*, which rejects this derivation, it is insisted that the *Atharva-veda* means Benares; its Sanskrit form being analysed into the names of the two streams which skirt the city near its eastern and western extremities.

‡ Of Kus'ika it has been stated that it signifies the river Kaus'akí—*recte*, Kaus'ikí. See *As. Res.*, Vol. XV., p. 454. But this is very questionable. A place near some sacred stream is probably here meant, rather than the stream itself.

§ North Kos'ala is supposed to be the old denomination for the vicinity of Ayodhyá. See the Translation of the *Vishnu-purána*, p. 190, foot-note 79; and Lassen's *Indische Alterthumskunde*, Vol. I., pp. 128 and 129.

|| Indrasthána, it is obvious to surmise, is another name for Indraprastha, or ancient Delhi.

¶ According to the *Matsya-purána*, he who gives away his weight in gold will abide in the heaven of Indra during the periods of all the Manus. Afterwards he reaches the city of Vishnu; and, when his hoard of merit is exhausted, he is born a universal monarch on earth. The *Agni-purána* adds that, in his renewed human condition he will be free from all disease.

Fitting objects to be given away in quantities equal to one's weight are, any of the metals, precious stones, several sorts of grain, various fruits, betel, saccharine



born,\* indented the earth, with his scales, on hundreds of occasions.

6. His son, Madanapála, the crest-jewel of princes, the ornament† of his family,‡ *now* bears sway; at whose consecration, by the water that glittered *as it was poured*§ from the *saered* vessels, the dust of *sin* of the world, *contracted* from the iron age, was wholly washed away:

7. At the time of whose going forth to conquest, as the orb of the earth yielded beneath *even* the light pressure of the foot-falls of his careering elephants, impassioned, *and* high as lofty mountains, *the serpent* S'esha, gorgeous with the clotted gore that trickled from his palate, cloven by his head-gem|| *which had been driven into it*, as it were, in consequence¶ of being crushed, hid his face for a moment in his bosom.

substances, honey, milk, curds, clarified butter, oil, salt, and sandal-wood. Particular benefits are promised to each species of such donation. The recipients of the presents are Bráhmans: but they must subsequently perform expiation.

Minute instructions are laid down for preparing the balance, and the consecrated ground on which it is set up. A lucky day must be chosen for the ceremony. The donor is poised against his gift for as long a time as it requires to milk a cow; contemplating Lakshmi the while. Numerous gods and sages, together with the manes, are hallowed on the occasion. The deity presiding over the scales is Váసుki.

The above is selected from the *Dána-chandriká*, by Divákara Bhaṭṭa, surnamed Kále; son of Mahádeva Bhaṭṭa, son of Rámes'a Bhaṭṭa.

The practice of bestowing one's weight in various substances is now and then observed, to this day. But, when metals are selected as the gift, they are rarely other than of the baser sort.

\* Anciently, persons of the first three classes; but, for many ages past, understood in the restricted acceptation of Bráhmans. The regeneration is effected by investiture with the sacred cord.

† Literally, 'the moon.'

‡ In the Sanskrit, *gotra*. A note on this word is given below.

§ Aspersions with water and other liquids plays a conspicuous part in the installation of a Hindu king.

|| In the Indian mythology, S'esha supports the centre of the earth on one of his thousand heads.

Hindu superstition assigns a precious stone to the head of every member of the serpent tribe.

¶ The original is *vas'at* 'by force.' As, however, the verb *push* means 'to

The same :—whose feet are justly revered by the entire brotherhood of potentates : son and successor\* of the auspicious Chandra Deva, supreme sovereign, great king, chief ruler, lord paramount, emperor;† who gained, with his own arm, the primacy of happy

crush,' 'to grind,' and not simply 'to press down,' the conjectural reading *bhayát* 'for fear' would yield a better sense : 'in the apprehension of being,' &c.

\* *Pádánudhyáta*. Professor Wilson—Journal of the Royal Asiatic Society, Vol. II., p. 393—errs in supposing that this formula may connect the names of contemporary rulers, sovereign and subordinate, to imply the inferiority of the latter. In the following volume of the same Journal, at p. 379, he remarks, on this expression, that it "is nothing more than a paraphrastic phrase for 'successor.' It means, literally, 'meditating upon his—the father's—feet;' denoting either the disposition of the son to imitate the paternal example, or to refer, with reverence, to the memory of his sire." Colebrooke, long before,—Transactions of the Royal Asiatic Society, Vol. I., p. 236 : or Miscell. Essays, Vol. II., p. 303,—had, however, written as follows : "*Pádánudhyáta*, an ordinary periphrasis for son and successor : literally, 'whose feet are meditated, i. e. revered, by ...'" In some cases,—as in this Journal for 1839, p. 491,—the same words are used, by a chieftain, of his favourite divinity.

For this locution, *pádánta-khyáta* has sometimes been substituted, in decipherments of inscriptions. See our Journal for 1848, Part I., p. 71 ; and for 1851, p. 676. This epithet would signify, if anything, 'whose toes are notorious.'

In this Journal for 1855, p. 487, the Sanskrit may be found of a short inscription which I translated from a version taken by an archæologist of established repute, Mr. Edward Thomas, from an obscure copy of what I now know to be a very rough original. In the second line, as printed, is the phrase *pádánudhyátasya* ; which is, of course, the correct reading for Major Cunningham's utterly meaningless *pádánadátasya*. See Bhilsa Topes, p. 151.

But I here mention this record chiefly with a view to express the opinion that it requires further examination before we can be positive about its contents. Four independent transcripts which I have lately had taken of it, have only served to increase bewilderment ; with the exception of determining that *आषाढमासे* stands in place of *आवणमासे*.

† *Parama-bhaṭṭáraka*, *mahá-rája*, *adhi-rája*, *parames'wara*, *parama-máhes'wara* : and, if regard be had to their etymology, these appellations are not classed by subordination ; for, to all appearance, the first and the last are indicative of co-ordinate eminence. The precise sense of *parama-máhes'wara* is 'supreme great lord.' In all cases, however, where *bhaṭṭáraka*, qualified, or unqualified, is met with in a list of this description, it stands at the head. Colebrooke says that it "answers to the title of majesty." Miscell. Essays, Vol. II., p. 303.

The *Aitareya-bhrámana*, in its concluding pentad, has a curious classification of



the various species of earthly rulers imagined to have derived their styles from the attributes invoked on Indra, at his consecration as king of the gods. The ensuing extract will suffice for the present purpose :

स एतेन महाभिषेकेणाभिषिक्त इन्द्रः सर्वाजितौरजयत् सर्वान् लोकानविन्दत्।  
सर्वेषां देवानां श्रेष्ठ्यमतिष्ठां परमतामगच्छत्। साम्राज्यं भौज्यं खाराज्यं वैराज्यं  
पारमेष्ठ्यं राज्यं माहाराज्यमाधिपत्यं जिवाऽस्मिन् लोके स्वयम्भूः खराल\*दृतेऽसु-  
स्मिन् स्वर्गे लोके सर्वान् कामानाप्त्वाऽमृतः समभवत् समभवत्।

8th *panchiká*, 3rd *adhyáya*, *ad finem*.

“ Thus consecrated by that great inauguration, Indra subdued all conquerable *earths*, and won all worlds. He obtained over all the gods, supremacy, transcendent rank, and pre-eminence. Conquering, in this world *below*, equitable domination (*sámrájya*), happiness (*bhaujya*), sole dominion (*swárájya*), separate authority (*vairájya*), attainment of the supreme abode (*párameshthya*), sovereignty (*rájya*), mighty power (*máharájya*), and superior rule (*ádhipatya*) ; becoming a self-existent *being* and independent ruler (*swarál*), exempt from *early* dissolution ; and reaching all *his* wishes in that celestial world ; he became immortal : he became immortal.” *Miscell. Essays*, Vol. I., p. 39.

This translation is Colebrooke’s ; with several terms of the original interpolated, and here and there a new word marked, as being surplus to the rigid letter of the text.

The various denomination of chiefs—included under the sway of Indra, the *Ekarál*, or ‘peerless lord’—intimated by the technicalities in this passage, are called, in the context, *Samrál*, *Bhoja*, *Swarát*, *Virál*, *Parameshthín*, and *Rájá* ; of which the first, third, and fourth are known, in more modern language, and with a notable change of character, as *Samrát*, *Swarát*, and *Virát*. See the Translation of the *Vishnu-purána*, p. 93 and its 3rd foot note.

Of the possessors of *máharájya* and *ádhipatya* no special powers, entitled *Mahá-rája* and *Adhipati*, are appropriated to certain quarters ; as the *Samrát* princes, for instance, are allotted to the North.

An extensive scope of jurisdiction is assigned to the *Rájás* :

अथैनमस्यां ध्रुवायां मध्यमायां प्रतिष्ठायां दिशि साध्याऽऽपत्याश्च देवाः षड्भि-  
श्चैव पञ्चविंशैरहोभिरभ्यषिञ्चेत्तेन च त्वचेनेतेन यजुषैतामिश्च व्याहृतभीराज्याय ।  
तस्मादस्यां ध्रुवायां मध्यमायां प्रतिष्ठायां दिशि ये केच कुरूपद्मालानां राजानः  
सवशोशौनराणां राज्यायैव तेऽभिषिच्यन्ते राजेत्येनानभिषिक्तानाचक्षते ।

*Aitareya bráhmaṇa*, *ubi supra*.

“ Next, the divine *Sádhyas* and *A’ptyas* consecrated him, *Indra*, in this middle, central, and present region, with the same *prayers from the Rik* and *Yajush*, and with the same holy words as before mentioned, in thirty-one days, for local dominion (*rájya*). Therefore the several kings of the *Kurus* and *Panchálas*, as well as of the *Vas’as* and *Us’ínaras*, in this middle, central, and present region, are con-

\* The *Vaidik L.*

Kanyakubja:\*—the fortunate Madanapála Deva, supreme sovereign, great king, chief ruler, lord paramount, emperor; victorious; commands, acquaints, and enjoins the inhabitants of the village of Ahuám, in the canton† of Vaṇesar-Maua;‡ and all his people; and likewise sojourners from abroad; as also kings, queens, princes consort,§ *imperial* counsellors, chaplains *royal*, warders of the gate, commanders of troops, stewards, justiciaries,|| physicians, diviners, consecrated to sovereignty (*rájya*); and *people* entitle those consecrated *princes*, *Rájá*."

This, too, is Colebrooke's translation, with a few changes, and such supplementation as is needed to make it intelligible in a detached quotation. *Miscell. Essays*, Vol. I., pp. 38, 39.

For the origin and exact signification of most of the expressions of dignity, found in our inscription, it may be that recourse must be had to records of the heroic or of the Pauránika period.

\* The spelling of this name is observable; and it is the same in both these grants. Very little dependence can be placed, here, or in other instances, on the transcription of Jayachandra's grant in this *Journal* for 1841, pp. 98, &c.: else it might be cited for the more common, but anomalous form, Kányakubja; which is, regularly, an adjective. Kányákubja is found still oftener; and the *Dwirúpa-kos'a* has a fourth variety, Kányákubja.

† *Pattalá*, in the Sanskrit. That this word corresponds to 'canton,' *mahal*, or *pargana*, will appear from another inscription, which I am preparing for publication.

‡ That is, I suppose, Vaṇesar near Maua; there being some second Vaṇesar, with which the present might be confounded. This mode of coupling the names of localities is still of very frequent occurrence in India, where, also as in other countries, a tract of territory is frequently denominated from its principal town.

Or *Maua* may be an affix, an old word whose sense is lost; unless it be the same as *mahúa*, from the Sanskrit *madhu*, or *madhuka*, the *bassia latifolia*.

*Mau* and *mahu* terminate many names of places, besides being found alone. Possibly they and *maua* are one vocable, under various forms. May it have meant 'village?'

§ *Yuvarája*, or "designated successor and associate in the empire." Colebrooke's *Miscell. Essays*, Vol. II., p. 286. "Young king, or Cæsar." *Select Specimen of the Theatre of the Hindus*, Vol. I., p. 280: 2nd ed. "Prince regent, or Cæsar." *Ariana Antiqua*, p. 265. "Vice-regent." Dr. Stevenson's *Kalpa-sútra*, p. 60. But the last definition is untenable. The *yuva-rája* is not succedaneous, but a coadjutor.

|| *Akshapaṭalika*; he who has cognizance of the *paṭala* 'litigation' of *aksha* 'judicial cases.' Or does *paṭala* mean 'filing?'

officers of gynecia, envoys, and persons who are proprietors of elephants, of horses, of towns, of mines,\* and of herds of kine.†

Be it known to you : whereas : after ablution in the Ganges, at the landing of the divine and blessed Trilochana, at Váránasí;‡ on Monday, the third *day* of the light semi-lunation, in the month of *Mágha*, the sun having entered its northern path,§ in the year eleven hundred and fifty-four ; or, expressed in numerals, on Monday, the 3rd *day* of the bright fortnight|| in *Mágha*, in 1154 of the *Samvat era*, at Váránasí: the village designated above ; with its water and soil, with its iron-mines and salt-pits, with and includ-

\* *A'kara-sthána* ; literally, ' the site of a mine.'

† Some of these terms have, as yet, no place in our dictionaries ; and several of them are, most probably, peculiar to the Sanskrit of the age in which the dynasty flourished to which the present patent appertains. For most of them, or of their synonymes, see the *As. Res.*, Vol. XV., pp. 21 and 45 ; *Transactions of the Royal Asiatic Society*, Vol. I., pp. 174 and 175 ; and this *Journal*, for 1839, p. 486. A number of them, ill-explained, occur in the same *Journal*, for 1841, p. 103.

‡ The quay of Trilochana, ' the Three-eyed,' or S'iva, still maintain its reputation for sanctity, at Váránasí, or Benares.

§ उत्तरायण ; corrected from उत्तरानयन of the copper plate ; most of the minor errors of which I have rectified without directing attention to them. Among these is the constant substitution of the dental sibilant for the palatal. One or two omissions of uniting concurrent vowels, disallowed by a severe conformity to the requirements of grammar, have been retained for sake of clearness.

|| Instead of शुदि, we often, and perhaps oftener, find सुदि ; as in the text. The *U'shma-riveka* has both forms. Though no other soher etymology of the word can readily be suggested, yet Dr. Mill's derivation of it, by abbreviation from शुक्लपचदिने should, therefore, be regarded with distrust. See *Journal of the As. Soc. of Bengal*, for 1835, p. 397. The Pandits look upon it as a word adopted into the Sanskrit from the vernacular languages. The *S'abda-kalpa-druma*, which has सुदि, is silent concerning its origin, and would restrict its use to ' the western country : ' पश्चिमदेशे प्रसिद्धः p. 6195. The corresponding term, वदि, is omitted by the *S'abda-kalpa-druma* ; and for a reason which not unfrequently has weight with this Encyclopædia. It is not in the Dictionary of Prof. Wilson.

Modern grammarians, fancifully enough, refer सुदि to सु or सुष्ठु and दान or ददाति, as importing the fortnight in which one ' appropriately presents ' offerings to the gods. In like manner they would derive वदि from अवद्यति, after aphaeresis, as denoting the half-month during which a Hindu ' devotes oblations ' to his ancestral manes.

ing\* its groves of *madhúkas*† and mango-trees, its orchards,‡ timber,§ grass, and pasture,|| with its holes and saline wastes, with *everything* above and below, its four abuttals being ascertained, as far as its borders: *which had been* granted by patent, in perpetuity,¶—by the illustrious king and chief ruler,\* the fortunate Chandra

\* The tautology, in the original, of *sa* and *paryanta* ‘with and including’ seems to be a speciality of legal documents.

† The *madhúka* is a sort of bassia, from the blossoms of which a spirituous beverage, called *mádhwi*, is extracted by distillation. By the laws of the *Mánava*s—XI., 95—the drinking of this liquor is forbidden to *Bráhmans*.

‡ The Sanskrit scholar will observe that it would have been permissible, if not even preferable, to connect the word rendered ‘groves’ with *mudhúkas*, and that translated ‘orchards’ with ‘mango-trees;’ especially if the last are coarsely described by the substantive *vana*. On the interpretation thus suggested, the writer will have affected the verbal collocation technically known, in the writings of the Sanskrit grammarians and rhetoricians, as *yathá-sankhya*, or “construction by the correspondent order of terms;” a figure of speech exemplified in this couplet:

“Hæc domus odit, amat, punit, conservat, honorat,  
Nequitiam, pacem, crimina, jura, prohos.”

Verses distinguished by the style of regimen here illustrated, are said to have been once called, by the French, “rapportez.” See Notes and Queries, Vol. VII., p. 167.

§ *Vitāpa*; trees in request for their wood, in distinction from those valued on account of their fruit or flowers. So say the native vocabularies.

|| *Triṇa-yúti-gochara*. These words, for ‘grass and pasture,’ are met with in an inscription translated by Colebrooke. He misreads them, however, *triṇa-dyati-gochara*. *Miscell. Essays*, Vol. II., p. 310. *Triṇa-yúti*, corrupted to *triṇayuthi*, has been taken for the name of a place, in this Journal for 1841, p. 103.

¶ The original, *ápadmasaḁmano húhúkántam yávat s’ásaníkṛitya*, is, a hundred to one, corrupt. Unable, however, to heal it by any convincing emendation, and content with a make-shift rendering, I avail myself of the fallacious ingenuity of a native scholar, to extract sense from it as it stands; more especially as the copper-plate pretty distinctly hears the phrase *húhúkántam*, in which lies all the difficulty. The ending—*kálam* was expected, whatever went before.

Divers pandits have assured me that *húhúka* is a name of the dog, derived from the animal’s cry, *húhú*; but no instance of the employment of this word has been produced. In one of the standard Sanskrit works on omens, that of *Vasantarāja*, the nearest word to *húhú* is *hohá*; and this is explained as being imitative of the scream of the jackal.

Assuming *húhú* to be as the pandits assert by the adjective of *ka*, from the

Deva; *he* having satisfied,† in due form, the divinities of the Vedas,‡ the saints, *deceased* mortals, malignant spirits, and *his own* group of progenitors; paying homage to the sun,§ of brilliance potent in penetrating the regions of darkness; worshipping him, on whose brow is a segment of the moon;|| adoring Vāsudeva,¶ the preserver of the triple universe; offering to fire\* an oblation of abundant rice, milk, and sugar;† in order to enhance the merit and celebrity of his mother, of his father, and of himself; having taken

verb *kai*, we get *hūhūka* ‘that which utters the sound *hūhū*.’ *Hūhūkānta* may, then, stand for ‘dog-killer;’ a possible equivalent of *s’wa-pach* ‘dog-cooker,’ the name of a tribe of pariahs.

Consonantly to these premises, the English of the clause is as follows: ‘Apprizing all *rational beings*, from Brahmá to the outcast.’ Brahmá is called ‘the lotus-tenemented,’ with allusion to the medium through which he originated from Náráyana.

Th purport which, on the exposition here set forth, has been attached to the verb *s’ás*, is, to be sure, countenanced by the dictionaries. Yet there is no question that, in a land-grant, the odds are overwhelmingly against the use of *s’ás* otherwise than to express ‘by patent;’ above all, in such a form as *s’ásanikṛitya*; and considering that the present instrument contains no declaration, if it be not this, to show by what species of document the land was alienated.

The point thus discussed will be definitively cleared up, should another of Madanapála’s grants or re-grants happen to be discovered. The formula in dispute would, doubtless, turn out to be one of duration. It was exchanged for another, by Madanapála’s immediate successor, Govindachandra. See the next inscription.

\* *Rájádhirája*, ‘king and chief ruler.’ Colebrooke represents these epithets by “conspicuous monarch.” *Miscell. Essays*, Vol. II., p. 258.

† By drink-offerings.

‡ Or gods propounded in the litanies of the Vedas.

§ *Ushṇa-rochisha*; literally, ‘of warm lustre.’ Compare the third note above.

|| The divinity thus characterised is S’iva. ‘Moon’ is here expressed by an epithet: ‘the regent of deciduous vegetation.’

¶ Vishṇu incarnate as Kṛishṇa.

\* Here, and in many other inscriptions, in similar circumstances, the accusative is inaccurately put for the locative. We should read *हृविर्भुजि*, not *हृविर्भुजं*. So Colebrooke—*Miscell. Essays*, Vol. II., p. 300—has edited *हृरण्यरेतसं* for *हृरण्यरेतसि*.

† The composition formed of these three ingredients, is called, in the Sanskrit, *páyasa*.



water in his palm, purified by *incurring it into the form of a cow's ear*, and by *kus'a* grass;\* to the Bráhmaṇ, the auspicious Vámana Swámi S'arman; son of the Bráhmaṇ, the auspicious Váráha Swámin, and grandson of the Bráhmaṇ, Deva Swámin; sprung from the stock of Kus'ika, and from three branches,† *those of Vis'wámitra, Audala, and Devaráta*; and of the Chhandoga division of the *Vedas*:‡ has, by us, cognizant of this *transaction, and with intent to*

\* Of the correctness of this rendering I am not quite positive. *Gokarna* signifies, primarily, 'a cow's ear;' and, secondarily, 'the length of a cow's ear, or a long span,' and 'an auspicious inflexure of the hand into the form of a cow's ear.' For the last, and least usual acceptation, an authority occurs in the following couplet, which is adduced anonymously in the *A'chára-mayúkha* :

उद्धृत्य दक्षिणे हस्ते जलं गोकर्णवत्कृते ।  
निश्चासनासिकाग्रे तु पाप्मानं पुरुषं स्मरेत् ॥

To continue; while *kus'a-latá* perhaps intends 'sacrificial grass' simply, it may mean 'the grass called *kus'a* and that known by the name of *latá*.' But the latter is not, to my knowledge, made use of for religious purposes: neither, by any forthcoming warrant, is *kus'a* comprehended under the class of *latá*, or 'creepers;' nor is *latá* a generic term for 'grass,' though it does import grass of a certain species, the *panicum dactylon*.

† 'Stock' and 'branch' but vaguely answer to the original words, *gotra* and *pravara*; of which Colebrooke says that the first expresses "descent from an ancient sage—*rishi*—, whence the family name is derived;" and that the second indicates "lineage traced to more of the ancient sages." The same venerable authority adds that "the distinction between *gotra* and *pravara* is not very clear." *Miscell. Essays*, Vol. II., p. 305. See also, *Digest of Hindu Law, &c.*, Vol. III., p. 327, foot-note: 8vo. ed.

Prof. Wilson, in his *Glossary of Indian Terms*, affords no additional aid whatever towards defining these expressions. Nay; he does not even lead one to infer that any the slightest difficulty was ever experienced in discriminating them. The most that is known as to the difference between them is, that the *gotra* is primitive, and that the *pravara* is somehow derivative from it.

Sir H. M. Elliot justly observes that "it has become the custom to call all subdivisions of tribes, *gotes*, or *gotras*." *Supplement to the Glossary of Indian Terms*, Vol. I., p. 351.

In all cases where the family antecedents of a Bráhmaṇ are unknown, he is presumed to belong to the *gotra* of *Kas'yapa*, and the *White Yajur-veda* is adjudged to him for his portion of scripture.

‡ This is the *Sáma-veda*.

publish our father's deed of gift, been assigned *anew*; we recording the grant on a plate of copper, accompanied by a seal\* engraven with our name.†

Bearing *this* in mind, and observant of *our* injunctions, you will pay all dues, as they fall to be discharged; namely, share of produce,‡ imposts, money-rent, and the rest.

The *annexed* stanzas§ are here *appropriate* :

\* This seal has, for legend, the words असह्नुवास्तदेवः 'The auspicious Madanapála Deva.' The addition *deva* 'divine' is generally affixed to the name of a Hindu king, to mark his rank.

The figure of a conch is incised, by way of device, beneath the name in question, which is surmounted by a sketch of Garuḍa.

† Portentous as is the length of this period, it is surpassed in the original. Considering, however, that we are dealing with a formal deed of transfer, it is neither unusually protracted nor unusually involved. It will be perceived that, with a view to greater perspicuity, I have transposed, in my translation, several clauses of the Sanskrit.

The date of the ceremonial washing at Benares I should be disposed, but for the word *snátwá*, to refer to Madanapála's father rather than to Madanapála himself. But, if it was the former that bathed at that time, the instrumental case of the past participle, or *snátena*, would have been used, to agree with *chandradevena*. On the construction accepted, the year of the primitive grant is wanting; a default which might be argued as leaving, in ordinary circumstances, an opening to endless contestation retrospective from the time of its renewal.

The original document, at the issuing of the present edict, was, it should seem, lost, and not even a certificate of its date producible. But the author of the re-grant being the king, his bare admission that the grantor was his royal sire, would be sufficient to preclude all action at law bearing on the title of the village propounded in the patent.

In the recital of the forms attending the primary grant, it will be remarked that no mention is made of bathing on the part of Chandra Deva. The specification of this important observance must, for completeness, be resumed from the notice, higher up the sentence, of its performance by Madanapála; in whose case it is, perhaps, just to conclude that no other rite over and above ablution was imperative. But, to ascertain whether completeness of detail has here been sacrificed to brevity of expression, requires investigation which must be remitted to another opportunity.

‡ भागभोग, or, as elsewhere, भागाभोग; 'rent in kind;' in contrast to हिरण्य 'gold,' 'rent in cash.' See Colebrooke's *Miscell. Essays*, Vol. II., pp. 306 and 312.

§ Almost all inscriptions recording charters of laud are embellished with some

1. He that receives land, and he that bestows land, both, as performing acts of merit, assuredly go to elysium.\*

of the nine stanzas here collected, or similar ones; little uniformity being observed, however, in their arrangement. Most of them, if not all, are, somewhere or other, attributed to Vyása or the Munis. The probability is, that they are derived from the *Mahábhárata* and the *Puráṇas*. One or two may be taken from the *Rámáyana*. A few have been traced to their sources, mediate or immediate; as will subsequently appear. Their various readings are numerous; but it has not been thought necessary to adduce, in more than one or two instances, such as are immaterial. The rest are dwelt on at length.

\* This couplet, attributed to a Muni, or Sage, will be found translated in Colebrooke's *Digest of Hindu Law, &c.*, Vol. II., pp. 166, 167: 8vo. ed. In the original I have corrected प्रतिगृह्णाति to प्रतिगृह्णाति; and I have changed नियतो to नियतं, the preferable and more frequent reading. These verses are very often met with. They occur, with minute variations, in all three of the law-works about to be named.

In express contradiction to the maxim which they deliver, a metrical precept, quoted in the *Práyas'chitta-mayúkha* and *Prayas'chitta-muktávalí*, and there wrongly imputed to the code of the *Mánavas*, pronounces, in substance, that the acceptor of land falls into a place of torment:

हिरणं भूमिसञ्चं गामन्नं वासस्त्रिलान् घृतम् ।  
अविद्वान् प्रतिगृह्णानो भस्मीभवति दासवत् ॥

This bold enunciation is, however, in good part glossed away by refinements and exceptions. The Hindu Rhadamanthus is wonderfully tolerant of sophistry.

In the first place, the acceptance of land without a spiritual fee is ruled, by the *Dánachandriká*, to be no delinquency whatever. This act is, accordingly, not viewed as objectionable, unless an attempt is made to sanctify it by religious rites. See the last note, p. 224.

When ritual observances are connected with it, a new character at once attaches to the deed. It now becomes sinful, and demands satisfaction. One treatise prescribes, as the appropriate expiation, the penance of Prajapati and the bestowal in charity of one-sixth of the gift; the donee retaining the remainder. Another treatise is more unrelenting in its exactions; requiring three performances of the ardent penance, three ablutions daily for four months, and alms as before; the residue of the donation likewise remaining with its receiver.

The penance of Prajapati is thus described: "When a twice-born man performs the *common* penance, or that of Prajapati, he must for three days eat only in the morning; for three days, only in the evening; for three days, food unasked but presented to him; and for three days more, nothing." *Laws of the Mánavas*, XI., 212. But compare *Yájurveda*, III., 320.

Of the ardent penance we have the following account: "A Bráhman, perform-



2. A conch,\* a throne, an umbrella, the best of horses, and the choicest of elephants; these *royal* insignia, Purandara,† are the requital of giving away land.

3. Again and again does the fortunate Ráma conjure all these and future lords of earth. This bridge of virtue, *the granting of land*, is common to all princes, and to be cared for, by your majesties, in successive ages.‡

ing the ardent penance, must swallow nothing but hot water, hot milk, hot clarified butter, and hot steam, each of them for three days successively; performing an ablution, and mortifying all his members." Laws of the Mánavas, XI., 215. Yájnavalkya—III., 318—makes it to consist in drinking hot milk, hot clarified butter, and hot water, each for a day; with fasting for one night. Parás'ara lays down the quantity of milk, butter, and water.

Land received in free gift it is wrong to dispose of by sale; but the selling of it is expiated by a solemn sacrifice—*yajna*. Again, the man who, though able to vindicate his rights, tamely relinquishes his land, when usurped by another, without recourse to litigation—*apañala*, goes to some hideous hell, there to remain for one and twenty cycles. If he foregoes all endeavour to obtain justice, he should destroy himself; and, by this destruction, he escapes the infernal regions. See a note above, on *Akshapañalika*, at p. 228.

The *Práyas'chitta-mayúkhá* is by Nílakanṭha Bhaṭṭa, son of S'ankara; and the *Práyas'chitta-muktávalí*, is by Divákara Bhaṭṭa, son of Mahádeva Bhaṭṭa, of the *gotra* of Bbaradwája. The *Dána-chandriká* has been spoken of in a previous note.

\* The bare possession of a *dakshinávarta*, or conch with its whorls turning to the right, is esteemed, by the Hindus, as securing, without fail, good fortune to its owner. Its employment for religious ends is also thought to be productive of extraordinary results. Some verses on this topic, purporting to be taken from a chapter of the *Varáha-purána*, will be found in the *S'abda-kalpa-druma*, p. 5106. These couplets inculcate, for example, that whoever sprinkles himself, in prescribed form, with water from such a shell, at a river running towards the East, is absolved from all past sin. So sacred is a shell of this description, that one may neither drink out of it, nor strike with it a fish or a swine.

† Purandara is a name of Indra.

‡ The second distich of this couplet has been strangely translated, as follows, in the Journal of the Bombay Branch of the Royal Asiatic Society, January, 1852, p. 110: "To preserve what has been granted, a common duty incumbent on all kings, is like a bridge for their safety, over an ocean of sins." Yet this is as close as the English versions of Indian inscriptions are generally.

Dr. Mill thinks that he finds the reading सज्ञान् for सवान्, in a citation of this verse, given on the Shekhávátí tablet. Journal of the As. Soc. of Bengal, for 1835, pp. 384 and 400.

4. By many kings, *such as* Sagara and others, the earth has been possessed. His, ever, whose is the soil, is *its* produce.

5. He that *wrongfully* resumes a single gold coin, a cow, or even one finger's breadth of glebe, incurs perdition till the consummation of all things.\*

6. He that *unjustly* confiscates land, *whether* given by himself, or given by others, transformed to a worm, grovels, with his ancestors, in ordure.†

\* Another form of this couplet, but without affecting the sense, has been noticed in inscriptions :

द्विरण्यमेकं गामेकां भूम्या अण्येकमङ्गुलम् ।  
हरन नरकमायाति यावदाभूतसम्भवम् ॥

A redundancy is observable in the fourth quarter of this stanza.

† A couplet almost identical with this, as to its first half, but combining, in a manner, for its remainder, the second distich of the stanza in the text, and the first distich of the stanza there succeeding it, occurs in the *Garuḍa-purāṇa*. With a slight variation, it is not uncommon in inscriptions. It here follows, with a part of its context :

खदत्तां परदत्तां वा यो हरेच्च वसुन्धराम् ।  
षष्टिं वर्षसहस्राणि विष्टायां जायते कृमिः ॥  
भूमेरङ्गुलदाता च स कथं पुण्यमाचरेत् ।  
भूमेरङ्गुलहर्ता च स कथं पापमाचरेत् ॥  
ब्रह्मस्य प्रणयाद् भुक्तं दहत्यासप्तमं कुक्षम् ।  
तदेव चौर्यरूपेण दहत्या चन्द्रतारकम् ॥  
लोहचूर्णाग्निचूर्णानि विषं च जरयेन् नरः ।  
ब्रह्मस्य त्रिषु लोकेषु कः पुमान् जरयिष्यति ॥  
देवद्रव्यविनाशेन ब्रह्मस्यहरणेन च ।  
कुलान्यकुलतां यान्ति ब्राह्मणातिक्रमेण च ॥

*Preta-kalpa, 30th adhyāya, s'l. 15-19.*

‘ He that usurps land, bestowed by himself, or bestowed by another, is born, for sixty thousand years a worm in ordure.

‘ What merit does he acquire who grants away *even* a finger's breadth of land ! And what guilt does he incur who, *without just cause*, appropriates *even* a finger's breadth of land !

‘ The estate of a Bráhmaṇ, possessed through avarice, burns *the seizer of it* to the seventh generation. Like theft, it indeed burns *him* while the moon and the stars endure.

7. Sixty thousand years does the donor of land abide in the regions of the blessed; and just as many does he dwell in hell, who practices disseizin, or acquiesces in it.\*

‘A man may digest iron-filings, powdered stone, and poison. But what man, in the three worlds, shall digest the property of a Bráhmán?’

‘By the destruction of consecrated wealth, by the *inequitable* seizure of a Bráhmán’s fortune, and by disrespect to Bráhmáns, *whole* families suffer degradation.’

In some inscriptions, the latter half of the first couplet above cited runs thus :

गवां शतसहस्रस्य हन्नुर्हरति दुष्कृतम् ।

‘—contracts demerit equal to that of the slayer of a hundred thousand kine.’

In other inscriptions, the first distich of this stanza is materially altered, as below; and the second distich is quite different from anything yet given :

स्वदत्तां परदत्तां वा यत्नाद् रक्ष नराधिप ।  
महर्षी महर्षीभूतां श्रेष्ठ दानान् श्रेयोऽनुपालनम् ॥

‘Diligently do thou guard, O king, land bestowed by thyself or by others. More meritorious, most eminent of princes, is the protection of *land* than is the giving of *it*.’

The *Bhágavata-purána* confines its denunciations to the sacrilegious :

स्वदत्तां परदत्तां वा ब्रह्मवृत्तिं हरेत् च यः ।  
षष्ठं वर्षसहस्राणि विष्टायां जायते कृमिः ॥

10th *skandha*, latter section, 64th *adhyáya*, 39th *s’l*.

‘He who wrongfully confiscates the wealth of a Bráhmán, bestowed by himself, &c.’

This couplet, with insignificant verbal deviations, is quoted by Jagannátha Tarkapanchánana Bháṭṭáchárya, in the *Viváda-bhangárṇava*, through the *Dípa-kaliká*. See Colebrooke’s Digest of Hindu Law, &c., Vol. II., pp. 165, 166; 8vo. ed.

Once more, from the *Bhágavata-purána* :

यः स्वदत्तां परैर्दत्तां हरेत् क्षुरविप्रयोः ।  
वृत्तिं स जायते विड्भुक् वर्षाणामयुतायुतम् ॥

11th *skandha*, 27th *adhyáya*, 64th *s’t*.

‘He who disseizes the gods or Bráhmáns of property conferred by himself or by others, is born, during ten thousand times ten thousand years, a feeder on dung.’

\* This couplet, but read a little otherwise, is cited, as from the *A’dipurána*, by Jagannátha Tarkapanchánana Bháṭṭáchárya. See the last note; and Colebrooke’s Digest, &c., Vol. II., p. 163; 8vo. ed.

The word नरकं, in the text, would well be exchanged for नरके.

According to Yájnavalkya—III., 230,—the forcible usurpation of land is nearly tantamount, as a crime, to theft of gold. Compare the Laws of the Mánavas XI., 58.

8. The donations—a source of merit, riches, and distinction—once bestowed, here *on earth*, by kings, rank with the reliques of sacrifices and with vomitings. What respectable person, forsooth, would take them again ?\*

The stealing of gold, agreeably to an anonymous text adduced in the *Práyas'-chittoddyota*, is counted among offences in the first degree :

ब्रह्महत्या सुरापानं स्तेयं गुर्वङ्गनागमः ।  
स्वर्णस्तेयं च तत्कर्त्रा संसर्गो वत्सरं तथा ॥  
महापापानि पञ्चैतान्युच्यन्ते ।

Equal explicitness on this article is wanting in the Laws of the *Mánavas*, IX, 235, and XI, 55 ; and in *Yájnavalkya*, III., 227.

In expiation of the purloining of gold, the *Mitákshará*, a commentary on *Yájnavalkya*, prescribes one observance of the ardent penance, a fast of three days' continuance, and eight thousand burnt offerings of clarified butter, with repetitions of the *gáyatrí*. It is added that the seizure of land is atoned by mortifications of half this severity.

The *Práyas'chitta-mayúkha* would visit with a much lighter animadversion, the delinquency thus absolved.

Bhaṭṭa Dinakara is author of the *Práyas'chittoddyota*. His father was Rámakrishṇa Bhaṭṭa, son of Náráyaṇa Bhaṭṭa, son of Rámes'wara Bhaṭṭa.

My reason for calling the classical 'Laws of Menu' by the more correct title of 'Laws of the *Mánavas*' will be seen by reference to an interesting letter of Prof. Max Müller, in Mr. Morley's Digest of Indian Cases, Vol. I., Introduction, pp. cxvii. seq.

\* Of this couplet we owe the following version to Colebrooke: "The gifts which have been granted by former princes,—producing virtue, wealth, and fame,—are unsullied reflections. What honest man would resume them?" *Miscell. Essays*, Vol. II., p. 313. For निर्माद्यवान्तप्रतिमानि, Colebrooke prints निर्माद्यवन्नि प्रतिमानि; his facsimile giving, however, *vánti*: and *vánti* may, by a strain, be taken, here, to import the same as *vánta*. *Vánti* occurs in this Journal for 1838, p. 738. But either reading is fatal to this great scholar's construction. This couplet, worded as in the present inscription, but ill-rendered into English, will be found in our Journal for 1839, pp. 299, 303; and for 1841, pp. 101, 104. For the like reading, and a correct interpretation, see this Journal for 1839, pp. 487, 494. Compare, further, the *As. Res.*, Vol. I., p. 365, 8vo. ed.; and Vol. XV., p. 452.

An obvious objection to Colebrooke's lection,—which seems to be a tacit alteration of his original,—resides in the awkward, and perhaps impurely formed word *nirmádyavat*, to signify scarcely more than what is expressed by *nirmala*; and in the unnatural air imparted to the whole stanza, as the result of taking *pratimáni*,

9. Inconstant as the rack is this *vaunted* kingship. Sweet for but the passing moment are the delights of things of sense. Like

for the plural of the substantive *pratimāna*. Another proof that the view which I here adopt is correct, is afforded by the fact that, in other inscriptions, the words *nirbhukta-mālya* stand in the place of *nirmālya-vānta*. See this Journal for 1838, pp. 914, 973. *Nirbhukta-mālya*, 'discarded flowers,' or flowers once flung on an idol, and not to be re-employed in the same manner.

Professor Wilson, in his Sanskrit Dictionary, neglects to distinguish, with respect to their derivation, between the terms *nirmālya* 'pure,' 'purity' and *nirmālya* 'the remains of an offering.' As to the latter, its second factor, which is *mālya* 'flowers,' has nothing to do with *mala* 'impurity.' When our *nirmālya* is taken in its ordinary comprehensive acceptation, the element *mālya* is to be understood illustratively, as sub-indicating or connoting all articles of food, &c., while literally denoting blossoms; all which are alike rendered, by oblation, unfit to be used again for a like purpose.

The reliques of oblations to Ś'iva form a fertile theme of disquisition in Hindu law-books. The subjoined injunctions and distinctions have been collected from the *Nirṇaya-sindhu*, which treats of this subject in the first section of its third book.

According to the *Siddhānta-s'ekhara*, as there quoted, edibles, water, betel, powdered sandal-wood, and flowers, which have been devoted to Ś'iva, become the perquisites of Chaṇḍa or Chaṇḍeś'a. To sell them, or other things so offered, or to give them away, or to take any of them for food, whether voluntarily or involuntarily, is reputed a grave offence, and requires the reparation of grievous penances. The *Smṛityartha-sāra* pronounces that whoever perseveres in eating any article thus offered, is degraded from his class; and that great, though inferior, guilt is incurred by partaking in diet of the sacrificial leavings of any deity whatever, in times exempt from distress. A reservation is made, however, by the *Bhāvishya-purāṇa*, on behalf of all votaries of Ś'iva, and all who have received his initiatory incantation, as concerns objects presented to the twelve *Jyotirlingas*, phalli from the river Bāṇa near Jubulpore, such as are spontaneous, or ideal, or set up by gods or divine sages, or composed of ammonite, the moon-stone, or any metal. Chaṇḍa has here no claim. The phalli meant to be excepted are those of stone, erected by common mortals, and such as are fashioned of plastic mud, turmeric, clarified butter, &c.

The *Traivikramī* cites the *Skanda-purāṇa* as further imputing great sanctity to images of Ś'iva in the human form. The eating, by a proper person, of offerings consecrated to such idols, avails to expunge even the crime of Brāhmanicide. An improper person, on the credit of this Purāṇa, is one unbathed. Other authorities consider as out of the pale, all who do not wear the thread of regeneration; and Ś'ridatta would deny the privilege to all save initiated followers of Ś'iva. The



a dew-drop on the point of a spear of grass is the vital breath of human kind. Ah! virtue is *one's* sole companion on the journey

*S'iva-purāna* is still more comprehensive in its enumeration of those who are disqualified for partaking of the sacred food. The *Kās'ī-khaṇḍa* eulogizes the practice of wetting the head with water with which the priapic emblem of *S'iva* has been sprinkled. The merit of so doing is alleged to be equal to that of bathing in the Ganges; and he who thrice drinks water that drips from the *linga*, is cleansed from all the three classes of sin,—the corporeal, verbal, and mental.

The *Tithi-tattwa*, *Hemādri*, and *Paris'ishṭa* assert that food, leaves, flowers, fruit, and water, offered to *S'iva*, acquire purity only when he is represented by the ammonite, in the worship of the *pañcháyātana*, or 'receptacle of five *deities*, or *types*.'

The deities represented, or symbolized in the *pañcháyātana* are *S'iva*, *Vishṇu*, *Súrya*, *Gaṇes'a*, and *Durgá*. Four of the images, or types are arranged around the fifth, the most highly considered of all; and this varies accordingly as the worshipper is a *S'aiva*, a *Vaishṇava*, a *Sawra*, a *Gáṇapatya*, or a *S'akta*.

In the *Nirṇaya-sindhu*, *Bopadeva* and the *Padárthádars'a* and vouched for the disposition of these idols, or symbols. In the *A'chárarka* a memorial verse is, more commodiously recited, to suggest their succession:

शंखासूत्रगभनाशङ्खसूत्रभङ्गनाभग- ।

नाशङ्खभभनाशङ्खस्वित्यं संस्थाय पूजयेत् ॥

*S'am* stands for *S'ankara*, or *S'iva*; *Ná*, for *Náráyana*, or *Vishṇu*; *Sú*, for *Súrya*; *Ga*, for *Gaṇes'a*; and *Bha*, for *Bhagavatí*, or *Durgá*. The first named divinity of each group comes in the centre. The rest, in the order here shown, are placed about him, at the interquarters, beginning with the N. E.

Sometimes these images are seen collected in temples. They are then of liberal dimensions; and only one of the five objects, the obscene emblem of *S'iva*, has other than an animal form, more or less distorted. Most Hindus have a private set of the five types, on a small scale. These they carry in a metallic vessel, hemispherical in shape, about an inch and a half in diameter, provided with a cover, and having a stiff paper bottom to preserve these reverend remembrancers from falling into horizontal confusion. The vessel is now and then constructed in the similitude of a lotus. The symbolical substitutes of *S'iva*, *Vishṇu*, *Súrya*, *Gaṇes'a*, and *Durgá*, are, in order as enumerated, a phallus of stone from the *Baṇi*, an ammonite from the *Gaṇḍakí*, a piece of the crystal called *súryakánta*, some leaves of the red-blossomed oleander, and a lump of pyritic iron-ore.

The *Nirṇaya-sindhu* or *Nirṇaya-kamalákara* has, for its author, *Kamalákara Bhaṭṭa*, son of *Rámakrishṇa Bhaṭṭa* and *Umá*, and younger brother of *Divákara Bhaṭṭa*. It was composed in the Samvat year 1661, or A. D. 1718. The *A'chárarka* is by *S'ankara Bhaṭṭa*, son of *Nílakaṇṭha Bhaṭṭa*, son of *S'ankara Bhaṭṭa*.

to the other world.\*

10. This ratification of patent, promulgating *his* father's donation, the auspicious Madava Deva procured to be executed, with his proper seal *thereto attached*.

Engrossed by the respectable† and thrifty Sahadeva, scrivener.‡

Prosperity *be* here! *May* favourable fortune *and* great felicity *attend!*

*Executed* by the illustrious Madanapála Deva.

Of the inscription given below, a negative facsimile in lithograph will be found in the Journal of the Archæological Society of Delhi, for September, 1852. To test this facsimile I have been assisted by a careful transcript of the original, for which I am indebted to the late Mr. F. Taylor, Principal of the Delhi College. In the Journal above mentioned is a professed translation of the inscription under consideration. Its inaccuracies, as to facts of

\* Colebrooke's version of this stanza is as follows: "This sovereignty of the earth totters with the stormy blast; the enjoyment of a realm is sweet but for an instant; the breath of man is like a drop of water on the tip of a blade of grass; virtue is the greatest friend in the journey of the other world." *Miscell. Essays*, Vol. II., p. 309; also p. 304.

But *vátábhra* is certainly a cloud borne by the wind, or tossed by the storm; rack, in a word. Again; where I have written 'kingship,' Colebrooke puts "sovereignty of the earth," instead of 'sovereignty of carth.'" The word *vishaya*, which I have translated 'things of sense,' may mean "realm:" but to render it so in this place produces at least an approach to tautology which I cannot believe is designed in the original.

† The original term, *दक्षुर*, Colebrooke twice renders by "venerable." *Miscell. Essays*, Vol. II., pp. 305 and 314. In the present instance I suspect that it denotes some office.

‡ In Sanskrit, *करणिक*, which I take to be related to *karana* "the usage or practice of the writer-caste," according to Professor Wilson. It therefore signifies a *Káyastha* or hereditary scribe. An allowable form, in the same sense, is *karaniin*, which makes *karani* in the nominative. Can it be from this that the word 'cranie' is corrupted? See Sir H. M. Elliot's *Supplemental Glossary*, pp. 196, 197.

I have not neglected to observe the words *कश्चिक* and *करणनि* in this Journal for 1837, p. 783, and for 1838, p. 46, respectively.



minor importance, are numerous ; but it seems unnecessary to make them the subject of detail. The remarks, by the Secretary of the Society, while correcting\* some of Mr. Prinsep's statements† touching the dynasty in discussion, were obviously made without recourse to that gentleman's reference,‡ and in ignorance of what had been written, by Professor Wilson,§ regarding the later kings of Kanoj.

## स्वस्ति ।

अकुण्ठोत्कण्ठवैकुण्ठकण्ठपोठलुठत्करः ।

संरम्भः सुरतारम्भे स श्रियः श्रेयसेऽस्तु वः ॥ १ ॥

आसीदश्रोतद्युतिवंशजातक्ष्मापालमालासु दिवं गतासु ।

साक्षाद् विवस्वानिव भूरिधाम्ना नाम्ना यशोविग्रह इत्युदारः ॥ २ ॥

तत्सुतोऽभून् महीचन्द्रश्चन्द्रधामनिभं निजम् ।

येनाऽपारमकूपारपारे व्यापारितं यशः ॥ ३ ॥

तस्याऽभूत् तनयो नयैकरसिकः क्रान्तद्विघ्नमण्डलो

विश्वस्तोद्गतवीरयोधतिमिरः श्रीचन्द्रदेवो नृपः ।

येनोदारतरप्रतापशमिताशेषप्रजोपद्रवं

श्रीमद्राधिपुराधिराज्यमसमं देविक्रमेणार्जितम् ॥ ४ ॥

तीर्थानि काशिकुशिकोत्तरकोशलेन्द्र-

स्थानीयकानि परिपालयताऽभिगम्य ।

हेमात्मतुल्यमनिशं ददता द्विजेभ्यो

येनाङ्किता वसुमती शतशस्तुलाभिः ॥ ५ ॥

तस्याऽऽत्मजो मदनपाल इति क्षितीन्द्र-

चूडामणिविजयते निजगोत्रचन्द्रः ।

यस्याऽभिषेककलशोत्सृष्टितैः पयोभिः

प्रक्षालितं कलिरजःपटलं धरित्र्याः ॥ ६ ॥

\* Journal of the Archæolog. Society of Delhi, for September, 1852, p. 3.

There is a mistake, however, in quoting the year 1075, instead of 1072.

† Useful Tables, Part the Second, p. 110. The carelessness here exhibited is a rare thing to meet with in this laborious and most convenient compendium.

‡ Journal of the Asiatic Soc. of Bengal, for 1834, p. 311.

§ As. Res., Vol. XV., pp. 460 seqq.

यस्याऽऽसीद् विजयप्रयाणसमये तुङ्गाचलोच्चैश्चलन्-  
माद्यत्कुम्भिपदक्रमासमभरभ्रश्यन्महीमण्डले ।

चूडारत्नविभिन्नतालुगलितस्थानाहृगुङ्गासितः

श्रेष्ठः पेषवशादिव क्षणमसौ क्रोडे निलीनाननः ॥ ७ ॥

तस्मादजायत निजायतबाहुवह्नि-

बन्धावरुद्धनवराष्ट्रगजे नरेन्द्रः ।

सान्द्रामृतद्रवमुचां प्रभवो गवां यो

गोविन्दचन्द्र इति चन्द्र इवाऽखुराशेः ॥ ८ ॥

न कथमप्यलभन्त रणक्षमांस्-

तिहृषु दिक्षु गजानथ वज्रिणः ।

ककुभि बभ्रमुरभ्रमुवल्लभ-

प्रतिभटा इव यस्य घटा गजाः ॥ ९ ॥

सोऽयं समस्तराजचक्रसंसेवितचरणः परमभट्टारकमहाराजाधि-  
राजपरमेश्वरपरममाहेश्वरनिजभुजोपार्जितश्रीकन्यकुजाधिपत्यश्रीच-  
न्द्रदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वरपरममा-  
हेश्वरश्रीमदनपालदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपर-  
मेश्वरपरममाहेश्वराश्वपतिगजपतिनरपतिराजत्रयाधिपतिविविध-  
विद्याविचारवाचस्पतिश्रीमद्गोविन्दचन्द्रदेवो विजयो हलदोयपत्त-  
लायामागोडलीग्रामनिवासिनो निखिलजनपदानुपगतानपि च रा-  
जराज्ञोयवराजमन्त्रिपुरोहितप्रतीहारसेनापतिभाण्डागारिकाक्षप-  
टलिकभिषग्नैमित्तिकान्तःपुरिकद्रुतकरितुरगपत्तनाकरस्थानगोकुला-  
धिकारिपुरुषानाक्षापयति बोधयत्यादिश्रुति च ।

यथा विदितमस्तु भवतां यश्चापरिलिखितग्रामः सजलस्थलः सलो-  
हलवणाकरः समस्थाकरः सगर्तोषरः समधूकाम्रवनवाटिकाविटप-  
टण्युतिगोचरपर्यन्तः सोर्ध्वाधश्चतुराघाटविशुद्धः स्वसीमापर्यन्तः द्य-  
श्रीत्यधिकैकादशशतसंवत्सरे माघमासि दृष्णपक्षे षष्ठां तिथावङ्कृतः  
संवत् ११८२ माघवदि ६ शुक्ले श्रीश्रप्रतिष्ठाने गङ्गायां स्नात्वा विधि-  
वन् मन्त्रदेवमुनिमनुजभूतपिडगणांस्तर्पयित्वा तिमिरपटलपाटन-  
पटुमहसमुष्णरोचिषमुपस्थायौषधिपतिशकलशेखरं समभ्यर्च्य त्रिभु-  
वनत्रातुर्वासुदेवस्य पूजां विधाय प्रचुरपायसेन हविषा हविर्भुजं ऊत्वा  
मातापित्रोरात्मनश्च पुण्यशोभिवृद्धयेऽस्माभिर्गोकर्णकुण्डलापूतक-

रतलोदकपूर्वं गौतमगोत्राभ्यां गौतमाङ्गिरसौतथ्यत्रिप्रवराभ्यां ठक्कुरोत्तमपौत्राभ्यां ठक्कुरश्रीश्वाल्हाणपुत्राभ्यां श्रीक्कीक्काश्रीवाक्कटशर्मभ्यामाचन्द्राकिं यावत् शासनीकृत्य प्रदत्तौ मत्वा यथा दीयमानभागभोगकरप्रवणिकरतुरुक्कदण्डप्रभृति सर्वदायानाञ्जाविधेयीभूय दास्यथेति ।

### भवन्ति चाऽत्र श्लोकाः ।

भूमिं यः प्रतिगृह्णाति यश्च भूमिं प्रयच्छति ।  
 उभौ तौ पुण्यकर्माणौ नियतं स्वर्गगामिनौ ॥ १ ॥  
 शृङ्खं भद्रासनं कृत्रं वराश्रा वरवारणाः ।  
 भूमिदानस्य चिह्नानि फलमेतत् पुरन्दर ॥ २ ॥  
 सर्वानेतान् भाविनः पार्थिवेन्द्रान्  
 भूयो भूयो याचते रामभद्रः ।  
 सामान्योऽयं धर्मसेतुर्नृपाणां  
 काले काले पालनीयो भवद्भिः ॥ ३ ॥  
 बह्वभिर्वसुधा भुक्ता राजभिः सगरादिभिः ।  
 यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् ॥ ४ ॥  
 गामेकां स्वर्णमेकं च भूमेरप्येकमङ्गुलम् ।  
 हरन् नरकमाप्नोति यावदाभूतसम्भवम् ॥ ५ ॥  
 तडागानां सहस्रेणाऽप्यश्वमेधशतेन च ।  
 गवां कोटिप्रदानेन भूमिहर्ता न शुध्यति ॥ ६ ॥  
 लिखितं चेदं ताम्रपट्टकं ठक्कुरश्रीविश्वरूपेणेति ।

#### TRANSLATION.\*

\* \* \* \* \*  
 \* \* \* \* \*

8. From him was born Govindachandra, as the moon was pro-

\* The first seven stanzas of the present inscription are a mere repetition of the opening of the former grant, if a few verbal discrepancies be left out of account.

It may be that, in the fourth stanza, we should read धीर for वीर; 'resolute' in place of 'valiant.' In Jayachandra's grant, at p. 98 of this Journal for 1841, the word is वीर. Capt. Fell, from his version of another of Jayachandra's patents,—in the fifteenth volume of the Asiatic Researches, p. 447,—seems to have had the same word before him. The Sanskrit of that patent has never been printed.

duced from the main ;\* a king by whom, with his far-reaching creepers of arms,† elephant-like upstart governments‡ were seized and coerced ; and who was a fountain of eloquence copiously distilling the essence of rhetorical nectar :

In the sixth stanza, कलिरजः पटलं 'the accumulated dust,' &c. is substituted for कलिरजः सकलं 'all the dust,' or 'the dust, wholly,' &c. Capt. Fell is too general to suggest what expression was here employed in his original just alluded to. The other grant of Jayachandra's has सकलं.

The same stanza, in this inscription, as in the last, in extolling Madanapála, exhibits विजयते 'bears sway,' a present tense ; though an indication of past time is here indispensable. It should seem that, notwithstanding the exigency of a new reign, the later poetical conveyancers entertained by the kings of Kanoj, were either unwilling or unable to mend the verses of their predecessor under Madanapála. Capt. Fell puts "was a victorious prince;" but without comment. "Was glorious" is the rendering given elsewhere ; and likewise unaccompanied by any remark. Journal of the As. Soc. of Bengal, for 1841, p. 101.

\* The more popular origin of the moon is from the ocean of milk, at the time it was churned by the immortals and the demons. *Mahábhárata, A'di-parvan, s'l.* 1145.

According to other accounts, the moon was son of Atri. "The *Váyu* says the essence of Soma—*somatwa*—issued from the eyes of Atri, and impregnated the ten quarters. The *Bhágavata* says merely that Soma was born from the eyes of Atri." Translation of the *Vishṇu-puráṇa*, p. 392, foot-note.

The history of the moon, prior to its extraction from the milky sea, in a legend which has a very Pauránika air, but which I have not been able to authenticate, is thus told by Capt. Fell : "A ray of glory from the eye of the holy saint Atri was so effulgent, that the Eastern quarter could not endure it. It was, accordingly, thrown into the ocean, where it became the moon." *As. Res. Vol. XV., p. 455.*

In the *Purusha-súkta* of the *Rig-veda*, the derivation of the moon is stated still differently. See Colebrooke's *Miscell. Essays*, Vol. I., p. 168.

† Long arms, or 'arms reaching to the knees,' are reputed, among the Hindus, a token of high lineage. The arm is, further, frequently compared, by them, to a vine, or to a staff.

‡ Capt. Fell ineptly explains the compound here translated 'upstart governments,'—or *nava-ráshṭra*,—as intending "Navarashṭra, a country in the South of India ; mentioned in the chapter of the *Mahábhárata*, detailing Sahadeva's conquests." *As. Res., Vol. XV., p. 455.*

But a king would, most assuredly, be much more likely to boast of successful subjugation, than of being endowed with bone and muscle sufficient to overmaster a wild beast, however powerful.

9. Whose embattled elephants in no wise succeeded in finding, in three of the quarters, *celestial* elephants equal to the conflict; whereupon, as it were rivals of the mate of Abhramu, they wended to the region of Vajrin.\*

The same:—whose feet are highly revered by the universal fraternity of potentates: son and successor of the auspicious Madanapála Deva, supreme sovereign, great king, chief ruler, lord paramount, emperor: *who was* son and successor of the auspicious Chandra Deva, supreme sovereign, great king, chief ruler, lord paramount, emperor; who gained, with his own arm, the primacy of happy Kanyakubja:—the fortunate Govindachandra Deva,† supreme sovereign, great king, chief ruler, lord paramount, emperor;

\* The Hindu mythology places an elephant, to uphold the globe, at each of its quarters and interquarters. Of these eight supporters, Airávata is esteemed the most redoubtable, and the chief of his kind. A female companion is attached to each of them; that of Airávata being Abhramu. Vajrin is an appellation of Indra; from *vajra*, the name of his weapon: and his region is the East, the station of Airávata.

Prof. Wilson, in his Dictionary, erroneously places Airávata in the North, the locality of Sárvaabhauma. In this mistake he is followed by Mr. Thomson, in his translation of the *Bhagavad-gítá*, p. 125.

The original of this exordium, from which Capt. Fell translated, was, beyond question, everywhere substantially, and almost everywhere literally, identical with the Sanskrit as printed in this paper. His version throughout is not, however, entirely trustworthy; as an examination of the mode in which he renders the last two stanzas might authorize one to infer, a general scrutiny apart.

“As the moon was produced from the ocean, so from Madanapála was descended Govindachandra. He was a prince of such vast strength that, by the grasp of his mighty arm, he was able to restrain an elephant of the kingdom of Navarashtra. He possessed cows giving streams of the richest milk.

“His herds of elephants could never meet with equals for combat in three regions—the North, South, and West. They, therefore, roved to the quarter sacred to Indra—the East;—seeking for Airávata. They were like warriors seeking for their adversaries.” As. Res., Vol. XV., p. 448.

† The seal attached to the plate of copper containing this inscription, bears, according to the lithograph in the Journal of the Archæological Society of Delhi, the words श्रीमद्गोविन्दचन्द्रदेवः. But this must be a mistake for श्रीमद्गोविन्दचन्द्रदेवः: ‘The auspicious Govindachandra Deva.’ Above the name is a figure of Garuḍa; and below it is a conch.

suzerain of the three *classes* of Governors styled masters of cavalry, masters of elephants, and masters of infantry;\* a Váchaspati† for inquisition into various sciences; victorious; charges, acquaints, and enjoins the inhabitants of the village of A'godali,‡ in the canton§ of Haladoya; and all *his* subjects; and likewise sojourners from abroad; as also kings, queens, princes consort, *imperial* coun-

\* *As'wapati*, *gajapati*, and *narapati*. The import of these phrases, as here employed, is undetermined. A cognate term, *chhatrapati* 'master of umbrellas,' may be named as sometimes associated with them. The first three expressions might be taken to denote, severally, the possession of a component part of an army; were it not for the omission of chariots, which are necessary, as a fourth element, to make up a complete martial host. But the word *rathapati* 'master of chariots' is never found, instead of *chhatrapati*, connected as above; and, if so found, in order to stand as a synonyme of it, *chhatra* must bear a sense at present unrecognised.

The epithet *gajapati* is known to have been affixed, from a certain age, to the names of the rulers of Orissa; the title of *narapati*—an ordinary equivalent of 'king'—is said to have been specially borne, at one time, by the sovereigns of Telingana and Karnáta; and the designation *chhatrapati* was affected by the Peshwas. The appropriation of *as'wapati* may admit of doubt.

It seems not impossible that, by these distinctions, so many feudatories, or classes of feudatories, of a paramount power were once discriminated. On this point, however, authentic history is, at best, only suggestive. As for the rest, it had already become the custom of Indian governors, early in the middle ages, to arrogate the lordship of three of these orders of royalets,—if they may so be considered. Among the Kanoj kings, Govindachandra was, apparently, the first who laid claim to this sort of pre-eminence. That a similar superiority was not asserted with respect to the *chhatrapatis*, is a circumstance worthy of note. Can it be that the *Chhatrapati rájá*, or *rájás*, whoever they were, enjoyed sufficient power to deter such a pretension? *As. Res.*, Vol. IX., p. 123; and Vol. XV., p. 254. *Journal of the As. Soc. of Bengal*, for 1838, p. 49; for 1839, p. 485; and for 1841, p. 103. *Mackenzie Collection*, Vol. II., pp. ccxxxv., ccxxxvi., and ccxxxviii.; where the mere names, of like aspect, of *Gañapati*, *Venkañapati*, and *Setupati* will also be seen. *Useful Tables*, Part the Second, p. 119. Preface to the *Praudha-pratápa-mártañda*, a law work. Preface to the *Siddhánta-chandriká*, the earliest commentary on the *S'ástra-dípiká* of the Mímáúsá.

† Or *Bṛihaspati*; preceptor of the gods.

‡ There is, possibly, on the copper-plate, a stroke of punctuation after the word preceding this name, and a mark of suspense under its final consonant. In that case, we must read 'Gođali.'

§ In the original, *pattalá*. See a note on the preceding inscription.



sellors, chaplains *royal*, warders of the gate, generalissimos, treasurers, justiciaries, physicians, diviners, custodians of the female apartment, envoys, and persons holding the proprietorship of elephants, of horses, of towns, of mines, and of herds of black cattle.

Be it known to you accordingly as *is here written*: that the aforesaid village, with its water and soil, with its iron-mines and salt-pits, with its fisheries,\* with its holes and saline wastes, with and including its groves of *madhúkas* and mango trees, its orchards, timber, grass, and pasturage, with *everything* above and below, its four abuttals being adjusted, as far as its borders: on the sixth day of the dark semi-lunation, in the month of *Mágha*, in the year eleven hundred and eighty-two; *or*, expressed in numerals, on Friday, the 6th day of the moon's wane, in *Mágha*, *Samvat* 1182: was by us granted,† by patent, for as long as the moon and sun shall endure:—having bathed in the Ganges, at *S'ris'a-pratishṭhána*;‡ having satisfied, in due form, the divinities of the Vedas, the saints, *deceased* mortals, malignant spirits, and *our own* group of progenitors; paying homage to the sun, of brilliance potent in penetrating the regions of darkness; worshipping him on whose brow is a segment of the moon; adoring *Vásudeva*, the protector of the triple world; offering to fire an oblation of abundant rice, milk, and sugar; *and* in order to promote the desert and renown of our mother, of our father, and of ourself; taking water in our palm purified by *bending it into the shape of* a cow's ear, and by *kus'a* grass:—to the fortunate *Chhíchhá S'arman* and *Váchhata S'arman*, sons

\* This appurtenance of landed property is an addition to the particularities of the former grant. Its recital may be taken to mark an advance in the refinements of conveyancing.

† Several unquestionable blunders of the lithographer, or of the engraver, I have silently corrected, in transcribing the original: for instance, in the Sanskrit of this word, प्रदत्ता, for प्रदत्तो; and above, संरम्भः for संरम्भः, यार for योध, अतिगम्य for अभिगम्य, and a general misuse of the sibilants. This inscription, like the former, also has हृदिर्भुजं, बरकां, &c.; which have already been the subject of remark.

‡ *S'ris'a*, or 'the lord of *S'ri*,' is *Vishṇu*. If *S'ris'a-pratishṭhána* be not the name of a town, it may, perhaps, indicate the celebrated temple of *Bindu-mádhava* at *Benares*, on the bank of the *Ganges*.



of the venerable\* and auspicious A'lhana,† grandsons of the venerable Uttama, and descended from the stock of Gautama and the three lines of Gautama, A'ngirasa, and Autathya.

Giving heed to this endowment, and observant of our commands, you will discharge all dues, as they fall to be liquidated; to wit, share of produce, tribute, quadrivial tolls, Muhammadan amercements,‡ and the like.

Bearing on this topic are these couplets:§

*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*

6. Not by the digging of a thousand reservoirs, nor even by a hundred hippocausts, nor by the gift of ten millions of kine, does the resumer of land make expiation.||

\* The original word is *thakkura*; and so of the 'venerable,' qualifying the name of Uttama. See a note at p. 241, supra.

† In the abstract translation of this inscription, above referred to, this name is strangely metamorphosed into "Alhad Pathuck Ras, a Brahmin of Singolee." A'godali will account for "Singolee."

‡ The latter two classes of impositions are not specified in the previous inscription. From the first of them it may possibly be inferable that the impoverishment of the imperial coffers had recently given rise to a new species of fiscal exaction; and, from the other, that the encroachments of the Northern invaders were gaining head, and that their domination was beginning to be recognised.

§ Of the six stanzas with which this instrument terminates, the first five are, with the exception of various readings, identical with the first five at the end of the former inscription. In the second distich at the conclusion of the present grant, we have, but without change of import, वराश्चा वरवारणाः in place of वराश्च-वरवारणाः. In the fifth distich, again, we here find a transposition; equally immaterial: गामेकां स्वर्णमेकं च for सुवर्णमेकं गामेकां.

|| In one place where this couplet occurs, the reading is सहस्रेण वाजपेयशतन 'by a thousand repetitions of the *vajapeya* sacrifice;' at which seventeen victims were immolated; and मुञ्चति 'obtains emancipation' for शुद्ध्यति 'performs atonement.' See Journal of the As. Soc. of Bengal, for 1841, p. 100.

Elsewhere, the word अग्नि, in the first measure of this couplet, is omitted. Journal of the As. Soc. of Bengal, for 1839, p. 493.

The immolation of a horse was once accounted "the king of sacrifices," and equal to efface all sin. See the laws of the *Mánava*s, XI., 261; and Colebrooke's *Miscell. Essays*, Vol. I., p. 238.

This grant on copper was indited by the respectable and thrifty Vis'warúpa.

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INDEX TO THE METRES IN THESE INSCRIPTIONS.

Stanza. First Inscription, before the prose.

- 1, 3. *Anushtubh.*  
 2. *Indravajrá.*  
 4, 7. *S'árdúlavikrídita.*  
 5, 6. *Vasantatilaká.*

After the prose.

- 1, 2, 4—7, 10. *Anushtubh.*  
 3. *S'álini.*  
 8. *Indravajrá.*  
 9. *Vasantatilaká.*

Second Inscription, before the prose.

- 1—7. As in the first inscription.  
 8. *Vasantatilaká.*  
 9. *Drutavilambita.*

After the prose.

- 1—5. As in the first inscription.  
 6. *Anushtubh.*

*Fort-Saugor, July 9, 1857.*

The proper time for entering on the performance of this sacred rite was, according to Mahádhara, the eighth day of the moon's increase in Phálguna; and, in the fabulous days of longevity and leisure, it was piously prolonged to twenty-seven years. Weber's *White Yajur-veda*, pp. 692 and 772.

That the sacrifice of a horse was not, originally, allegorical, is now placed beyond doubt. The animal was cooked, and some of it was eaten. Prof. Wilson thinks that part of the flesh was boiled, and part of it roasted. More probably, however, after the preparation of a broth, the meat was transferred from the caldrons to the spits. In the present day, Hindus who use animal food invariably deal with it after this manner. See the English Translation of the *Rig-veda*, Vol. II., p. 117, foot-note.

From the *Mahábhárata* it appears that, at a later period than the Vaidika, it was held sufficient to inhale the fumes of the seething gelatin of the victim. The whole was afterwards burnt. *As'wamedha-parvan*, s'l. 2644-2648.

Catalogue of the Coins in the Cabinet of the late Col. STACY, with the estimated prices attached.\*—By E. THOMAS, Esq., late of the B. C. S.

## GREEK COINS.

Gold.	Silver.	Copper.		Rs.	As.	P.
—	1	—	Drachma ALEXANDER the Great, .....	5	0	0
—	1	—	Hemidrachma—Seleucus Nicator,.....	12	0	0
			Obv. Head with Lion's-skin as in Alexander's Coins. Rev. Jove seated, Inscription ΒΑΣΙΛΕΩΣ ΣΕΛΕΥΚΟΥ. Monogram ΗΒ .....			
—	1	—	Tetradrachma of ANTIOCHUS MAGNUS—Wt. 252 grains—Obverse a very perfect head, in high relief. Reverse, Apollo sitting on the cortina, Inscription ΒΑΣΙΛΕΩΣ [ΑΝ] ΤΙΟΧΟΥ.....	50	0	0
—	1	—	PTOLEMY—with Eagle reverse—Wt. 211 grains, .....	10	0	0
—	2	—	Ditto less perfect, at 6 each, .....	12	0	0
—	—	2	2 Copper Coins, at 1 each (2 silver casts)	2	0	0

## BACTRIAN COINS.

## EUTHYDEMUS.

—	5	—	Four Tetradrachms as in " <i>Ariana Antiqua</i> ," plate I. figs. 6, 7 and 8—one ditto as No. 11, at 8 Rs.,@ .....	40	0	0
—	—	5	One very perfect specimen A. A. pl. I. fig. 13, .....	16	0	0
			One ditto very good 6—three bad at 2	12	0	0

## DEMETRIUS.

—	3	—	Two Oboli as in A. A. pl. II. figs. 4 & 5, one very perfect, at 12 and 5, .....	17	0	0
			One with <i>Kausia</i> as in A. A. supp. pl. fig. 12, .....	14	0	0

## APOLLODOTUS.

—	1	—	A. A. pl. IV. fig. 15, coin imperfect, ...	8	0	0
—	2	—	A. A. pl. IV. fig. 14, in very good order, at 6, .....	12	0	0

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„ 17 7

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210 0 0

\* This Catalogue was received through Mr. Grote after the subscription had been set on foot by the Society for the purchase of this collection in its integrity. It is published with the valuation of each piece as fixed by Mr. Thomas when the Trustees of the British Museum were negotiating for the purchase of the Cabinet, because it is believed that Mofussil collectors will be glad to have such particulars.  
—Eds.

Gold.	Silver.	Copper.		Rs.	As.	P
„	17	7	Brought forward,.....	210	0	0
—	—	3	A. A. pl. IV. fig. 16, in bad order, .....	}	9	0 0
—	—	6	Four of the type given under No. 17, pl. IV. A. A. and two of a slightly varied device, at 1 each,.....			
EUCRATIDES.						
—	1	—	A Drachma, not in A. A., Cunningham, pl. V. fig. 2, in very good order,.....	20	0	0
—	10	—	Oboli, A. A. pl. III. fig. 5, imperfect, at 1-8, .....	15	0	0
—	4	—	Ditto, A. A. ditto fig. 6, ditto, at 1-8, ...	6	0	0
—	—	1	Coin as A. A. ditto fig. 9, very perfect,...	8	0	0
—	—	6	Copper damaged, at 8 as.,.....	3	0	0
HELIOCLES.						
—	1	—	Hemidrachma, No. 8, supp. pl. A. A. ...	50	0	0
—	—	1	Cunningham, pl. II. fig. 9. Rare but imperfect, .....	2	0	0
ANTIMACHUS.						
—	6	—	Six very perfect Silver Coins, A. A. II. 15, at 7 each, .....	42	0	0
AMYNTAS.						
—	—	1	In very good order. Original engraved J. A. S. B. Vol. V. pl. 46, fig. 1, .....	}	16	0 0
—	—	—	Type as in fig. 14, pl. II. A. A.....			
ANTIALCIDAS.						
—	1	—	One S. Coin. Fig. 12, pl. II. A. A. very perfect and rare, .....	12	0	0
—	3	—	Hemidrachma's as No. 11, pl. II. A. A. very perfect, at 7, .....	21	0	0
—	3	—	Ditto as No. 3, pl. VII. <i>Cunningham</i> , (not in A. A.) two specimens imperfect, one in very good order, at 6,.....	18	0	0
—	—	1	Copper, as fig. 13, pl. II. A. A. in good preservation, .....	3	0	0
VONONES.						
—	—	2	Cunningham, pl. VII. fig. 5. Rare, but in bad order, at 1-4,.....	2	8	0
—	—	1	Vonones and Azas, unpublished type. Obv. Hercules with Club. Rev. Panther as in A. A. VII. 8, but in the reverse direction, in fair order, .....	16	0	0
ARCHEBIUS.						
—	—	1	Circular Coin, Victory and Owl, imperfect, (1 Silver Forgery.)	10	0	0
—	—	1	Square Spalygis, A. A. VIII. fig. 13, in good order, .....	6	0	0
(1 Silver Forgery do.)						
„	46	31		469	8	0

Gold.	Silver.	Copper.		Rs.	As.	P.
	46	31	Brought forward,.....	469	8	0
—	—	8	Hermæus, imperfect, at 8 as., .....	4	0	0
—	—	4	Kadaphes, A. A. XI. 14, in fair order, at 1-4, .....	5	0	0
—	—	25	Kadphises, bad, at 1 anna,.....	1	9	0
ABDAGASES.						
—	—	1	In fair order—rare,.....	2	8	0
—	1	—	Small Silver Coin Gondophares,.....	2	0	0
—	—	14	Copper Coins of ditto, at 2 as., .....	1	12	0
—	—	6	Ditto of dynasty of ditto, at 2, .....	0	12	0
MENANDER.						
—	41	—	A. A. IV. 1.—Very perfect coins with 4 varieties of mint-marks, ..	50	0	0
—	13	—	Bare-headed obverse, .....			
—	21	—	Helmed head obverse, <i>all</i> in first rate condition, (75 coins, at 12 as. each),...			
—	1	—	Helmed head, with Owl <i>reverse</i> , .....	10	0	0
—	—	8	Copper Coins, at 8 as. (and five Silver Forgeries), .....	4	0	0
MOAS, &c.						
—	2	—	Elephant head, type A. A. pl. VIII. fig. 11, <i>worn?</i> at 2 Rs., .....	4	0	0
—	2	—	Azas,—one Cunningham, XII. 6; one new type, obv. Horseman. Rev. Minerva Promachus, at 6 and 12,.....	18	0	0
—	2	—	Small Coins Azas, at 1 R. each,.....	2	0	0
—	—	57	Fifty-seven Copper Coins, some good types in fair order, at 4 as., .....	14	4	0
—	—	29	Pakores, imperfect, at 2 as., .....	3	10	0
—	—	33	Small Eucratides, at 1 anna, .....	2	1	0
—	—	10	Pakores style of obverse, with reverses, Fire Altars, each 2, .....	1	4	0
—	—	2	Old Indo-Bactrian type, A. A. XV. figs. 26 and 27, at 12 as., .....	1	8	0
—	—	29	Nameless King, A. A. IX. 11, 12, &c. at 1 anna,.....	1	13	0
ARSACIDAN.						
—	24	—	Various Kings, at 1-8, .....	36	0	0
—	—	8	Ditto Ditto, at 10 as.,.....	5	0	0
—	—	13	Small Copper Coins, various reverses, at 1½ anna. ....	1	3	6
—	—	27	Ditto, less perfect, at 1 anna., .....	1	11	0
—	—	6	Small Eucratides, at 1 an.,.....	0	6	0
—	—	36	Kadphises, at 1 an.,.....	2	4	0
—	—	56	Kanerkís, at 1½ an., various reverses, ...	5	4	0
—	—	84	Ooërkís, Elephant, ½ an., .....	2	10	0
<hr/>				<hr/>		
„	153	487		653	15	6

Gold.	Silver.	Copper.		Rs.	As.	P.
„	153	487	Brought forward,.....	653	15	6
—	—	58	Ditto, seated figure, $\frac{1}{2}$ an., .....	1	13	0
—	—	211	Miscellaneous Coins, at 1 an., .....	13	3	0
SASSANIANS.						
—	21	—	Pure Sassanians, various kings, at 1 R.,	} 30	0	0
—	3	—	Khúsrúis, at ditto, .....			
—	4	—	Indo-Sassanians, at ditto, and <i>broken</i> bits, 2 Rs.,.....			
—	—	74	Sassanians, <i>damaged</i> , .....	2	0	0
—	—	357	Indo-Sassanians of later date (some silver),	6	0	0
VARÁHAS and INDO-SASSANIAN <i>lower</i> types.						
—	8	—	Good selected specimens, .....	} 21	6	0
—	29	—	Small Fire Altar Reverses,.....			
—	134	—	Miscellaneous mixed specimens; 171 at 2 as., .....			
<hr/>				728	5	6
„	352.	1197				

## HINDÚ COINS.

*Kábul Kings. Brahmans.*

—	1	—	Khedáva, V. R. See Jour. Roy. As. Soc., Vol. IX. pl. fig. 5, .....	6	0	0
—	7	3	Syalapati's, at 12 as. See Ariana Anti- qua. Pl. XIX. fig. 6, &c., .....	7	8	0
—	—	6	4 Vanka Devas, 2 Samantas, Elephant type. See A. A. figs. 11 and 12, pl. XIX., at 12 as., .....	4	8	0
—	47	—	Samanta Déva's, at 8 as. each. A. A. XIX. fig. 1, &c., .....	23	8	0
—	—	34	Rude (Horseman and Hindi Reverse) J. A. S. Bengal, Vol. IV. pl. 36, fig. 11, at 2 as., .....	4	4	0
—	—	4	Selected Coins, one unpublished, in all 4-12,	4	12	0
—	—	10*	Madanpálas, at 6 as. Ariana Antiqua, XIX. 23, .....	3	12	0
—	—	13*	Chahera dévas, at 3 as., A. A. XIX. 16, &c.,	2	7	0
—	—	4*	Anungapálas, at 8 as., A. A. XIX. 15, &c.,	2	0	0
—	—	3	Malaya Vermás at 8 as., J. A. S. Bengal, Vol. IV. pl. 36, fig. 17, .....	1	8	0
—	—	10	Gobindas, C. at $1\frac{1}{2}$ as., .....	0	15	0
—	—	16	Kutlugh Kháns, at 2 as., A. A. XIX. 38,	2	0	0
—	33	—	Silver Coins of these types, at 4 as.,.....	8	4	0
—	—	57*	Billon ditto, at 3 as., .....	10	11	0
—	—	157	Copper Coins, at $\frac{1}{2}$ an., .....	4	14	6
—	—	2*	Madanpálas, at 6 as., .....	0	12	0
<hr/>				87	11	6
„	88.	319				

Gold.	Silver.	Copper.		Rs.	As.	P.
	88.	319	Brought forward, .....	87	11	6
—	—	1*	Anungapála,.....	1	0	0
—	—	4*	1 Prithvi Rája, at 6, as., A. A. XIX. 18.— 3 Someswáras, at 1 R. each. A. A. XIX. 28, Jour. R. A. S. Vol. IX. pl. fig. 16,	3	6	0
—	—	3	Selected Kangra Coins, at 4 as. each, ...	0	12	0
—	—	10	10 Selected Specimens, at 12 as., .....	7	8	0
—	—	447	Coins of the Kangra Dynasty (unarranged), at 1 an.,.....	27	15	0
—	—	46	Comprising nine varieties of Coins of the Datta and Mittra families, at 8 as., ...	23	0	0
—	—	59	Coins Miscellaneous, Mittra's, &c. at 8 as.	29	8	0
—	—	2	Silver Ayodhya, at 8 Rs. each, .....	16	0	0
—	—	2	Copper ditto, at 5 each, .....	10	0	0
—	—	26	Copper Miscellaneous, at 6 as., .....	9	12	0
—	—	21	Coins Yandheya, } 44, at 4 as. each,	11	0	0
—	—	23	Coins Behat type, }			
1	—	—	Skanda Gúpta, at 20 Rs., .....	20	0	0
1	—	—	Samudra very perfect, 60 Rs., .....	60	0	0
5	—	—	Ditto, at 18 Rs. each,.....	90	0	0
6	—	—	5 Chandra Gúptas, at 19 each, 1 Kacha, at 20, .....	115	0	0
4	—	—	Kumára Gúptas, at 19 each, .....	76	0	0
1	—	—	Ditto, cast, 6 Rs., .....	6	0	0
—	17	—	Saurashtran and Gúpta Coins, at 12 as.,	12	12	0
—	16	—	Gúpta Coins with Peacock Reverse, at 12 as. J. A. S. Bengal, Vol. IV. pl. 49, fig. 10, 11, &c., .....	12	0	0
—	—	4	Copper, at 4 as., .....	1	0	0
2	—	—	Debased Gold ( <i>Electrum</i> ) Coins, Prata- paditya, at 4 Rs.,.....	8	0	0
—	—	18	Copper ditto, at 2 as.,.....	2	4	0
15	—	—	15 Gold Kanouj Coins, at 8 Rs. each, ...	120	0	0
—	2	—	2 Silver at 1 R., ....	2	0	0
—	—	2	Copper, at 2 as., .....	0	4	0
5	—	—	Indo-Scythic <i>Baráno</i> , at 19 Rs., .....	95	0	0
2	—	—	Kauérkís, one very perfect 35 Rs., the <i>other</i> 18, .....	53	0	0
1	—	—	Ooérki, 18 Rs., (three Forgeries also),...	18	0	0
3	—	—	Later Gold Coins, at 10 Rs.,.....	30	0	0
—	7	—	Silver Hyrkodes, one very perfect, 14 Rs., 6 at 12 as. each, 4-8, .....	18	8	0
—	—	109	Cast Coins, at 1 an. each, .....	6	13	0
—	—	—	Small Coins of the Type depicted in fig. 33, pl. XXXIX. Vol. IV. Jour. A. S. Bengal, (in number 3,479!) .....	6	0	0



Gold.	Silver.	Copper.		Rs.	As.	P.
46	132.109½		Brought forward,.....	980	1	6
—	373	30	373 Silver punch-marked Coins. J. A. S. B. Vol. IV. pl. 35, figs. 25, 26, &c. The average weight of these coins is about 50 gr., at 5 as. each, .....	116	9	0
			30 Copper, at 1 an.,.....	1	14	0
13	—	—	13 Small Gold Coins of Nípál—total weight 12 grains, .....	3	0	0
—	11	—	11 Silver Coins, at 1 R. each, .....	11	0	0
—	3	—	3 S. Assam Coins, at 3, .....	9	0	0
—	3	—	3 Ditto, at 1-8, .....	4	8	0
—	30	1	30 Silver and 1 Copper, at 10 as. each,...	19	6	0
—	6	—	Tipperah Coins, at 2-8, .....	15	0	0
—	2	—	Kuch Behar, at ditto, .....	5	0	0
—	8	—	Kuchar, at 14 as., .....	7	0	0
—	4	—	Holkars, at 2-8, .....	10	0	0
—	2	—	Arrakan, at 14 as., .....	1	12	0
—	10	—	Ten Local Rupees, at 1-2, .....	11	4	0
—	—	5	Ceylon Coins, at 10 as., .....	3	2	0
3	—	—	Gold Coins (and two small pieces of Gold), .....	20	0	0
—	2	—	Tippú Sahebs, .....	5	0	0
8	—	—	8 Gold Húns, weight 55 gr. each,.....	36	0	0
—	—	41	41 C. Kashmir Coins, at 3 as. each, .....	7	11	0
—	—	40	40 Ujain Coins, at 10 as. each, .....	25	0	0
—	—	11	6 Satrap and 5 Ariano Páli Coins, at 8 as.,.....	5	8	0
—	—	46	Inferior ditto, at 2 as., .....	5	12	0
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## MOHAMMEDAN COINS.

The KHALIFS.						
1	—	—	Dated A. H. 157, .....	14	0	0
1	—	—	Small Coin, without date, .....	5	0	0
—	1	—	Struck at <i>الري Isfáhan</i> . A. H. 129, .....	} 45	0	0
—	3	—	Ditto at <i>المحمدية</i> A. H. 151 and 191, ...			
—	2	—	Ditto <i>Medinat ul Salám</i> . A. H. 155 and 192, .....			
—	1	—	Mint illegible, dated A. H. 158, .....			
—	1	—	Struck at <i>هرون آباد</i> A. H. 169. V. R. ...			
—	1	—	Ditto Bokhárá. A. H. 194, .....	9 Coins, at 5 Rs.)		
—	1	—	Unique, minted at <i>ايرشهر Nishápúr</i> . A. H. 211. On the <i>Obverse</i> is the name <i>طلحة</i> , on <i>Rev.</i> <i>الطاهري</i> ... ..	16	0	0
<hr/>				2	10	0
				80	0	0

Gold.	Silver.	Copper		Rs.	As.	P.
2	10	0	Brought forward, .....	80	0	0
—	8	—	Miscellaneous Silver Coins of nearly similar types and a number of broken coins,.....	12	0	0
SAMÁNIS.						
1	—	—	Nasr bin Ahmad—Nishápúr. A. H. 324, .....	12	0	0
1	—	—	Mahmúd of Ghazni—Herát. A. H. 412, .....	12	0	0
—	1	—	Ditto, .....	1	0	0
—	—	22	Mixed Khalif and Samánis, at 12 as. each, .....	16	8	0
—	—	4	Broad Coins, Mint illegible, dated A. H. 348 and 349,.....	2	0	0
—	—	13*	Miscellaneous Ghazni and Ghor Coins, each 6 as.,.....	4	14	0
—	—	19	Ditto, of various types, at 3 as., .....	3	9	0
—	—	1	1 <i>Unique</i> Fire Altar Coin, device composed of Arabic legends curiously arranged to imitate the original design, .....	20	0	0
—	—	135	Copper Coins chiefly Samánis, at 4 as.,...	33	12	0
MISCELLANEOUS SILVER COINS.						
—	29	—	Coins of عزالدین کرمان محمود? dated A. H. 761? at 10 as.,.....	18	2	0
—	2	—	Herát Coins, dated A. H. 751, at 1-8, ...	3	0	0
—	1	—	Il-Khan Bokhára Mint, .....	1	8	0
—	10	—	Sháh-Rókhís, at 9 as.,.....	5	10	0
—	1	—	A Ghazni Coin of محمد بن طرعاتا? A. H. 773, .....	3	0	0
—	3	—	1Abúsáid : 1 Khákán خليل الله A. H. 742 : 1 Abdullah A. H. 915, .....	6	0	0
—	3	—	Two more of a similar class, 2 Rs. One Sejúk Kái Khusrú bin Kái Kobád, 3 Rs.....	5	0	0
—	4	—	Miscellaneous Silver Coins, at 8 as.,.....	2	0	0
GHAZNI COINS.						
2	—	—	Mansúr bin Nóh Samáni, struck at Herát, A. H. 360 and 361, .....	24	0	0
—	6	—	Subuktagiús, at 1-8,.....	9	0	0
—	1	—	Ismáil, V. R. ....	6	0	0
2	—	—	Mahmúd, Herát and Ghazni, at 14, .....	28	0	0
—	2	—	Seif ud dowlat, V. R. 5: one <i>Unique</i> type 6; .....	11	0	0
—	12	—	4 Ghazni Mint, A. H. 375, at 12 as.: 8 ordinary, at 8 as., .....	7	0	0
—	18	—	Miscellaneous Silver Coins of Mahmúd, at 6 as., .....	6	12	0
8 111 194				333 11 0		

Gold.	Silver.	Copper.		Rs.	As.	P.
8	111	194	Brought forward, .....	333	11	0
2	—	—	Masaud's 1 Ghazni, A. H. 423 at 12; a second at 14, .....	26	0	0
—	3	—	Balkh Coins, at 12 as., .....	2	4	0
1	—	—	Gold Coin, dated A. H. 428, .....	14	0	0
—	2	—	Modúds, at 1-8, .....	3	0	0
—	4	—	Ibrahim's, at 12 as., .....	3	0	0
—	2	—	Behrám Sháh's, at 1-8, .....	3	0	0
—	1	—	Khusrú Shah, .....	2	0	0
—	—	19	Copper Coins, at 2 as. each, .....	2	6	0
1	—	—	Ala-ud-din Muhummad bin Takash, .....	8	0	0
—	2	—	One large and one small Silver Coin, at 3 Rs. and 1-8 each, .....	4	8	0
—	—	22	Copper Coins, at 5 as., .....	6	14	0
PATHÁN KINGS OF DELHI.						
1	—	—	Tughlak Sháh, A. H. 721, (wt. 168 gr.) .....	24	0	0
1	—	—	Muhummad bin Tughlak, A. H. 727, ... ..	20	0	0
1	—	—	Ditto. New Type, Déogir, A. H. 727, (200 gr.) .....	50	0	0
—	3	—	Nasir-nd-din Mahmúd, at 2, .....	6	0	0
—	4	—	Balban's, at 3, .....	12	0	0
—	4	—	Feróz's, at 3, .....	12	0	0
—	5	—	Kaikobáds, at 4, .....	20	0	0
—	1	—	Tughlak Shah, 5, .....	5	0	0
—	1	—	Khusrú unique, but in bad preservation, .....	50	0	0
—	17	—	Alá-ud-din Mohammed Sháh, at 1-8 each, .....	25	8	0
—	15	—	Shír Sháh's, at 1-8, .....	22	8	0
—	14	—	Islám Sháh's. One at 5 Rs., the rest at 1-8, .....	24	8	0
PATHÁN'S (Copper.)						
—	—	64*	Muhummad bin Sâm, at 2½ as., } .....	15	0	0
—	—	32*	Altensh, at ditto, .....			
—	—	23*	Masaud Sháh, at 2 as., .....	2	14	0
—	—	61*	Mahmúd, at 1½ as., .....	5	11	6
—	—	44*	Balban, at 2 as., .....	5	8	0
—	—	16*	Kái Kobád, at 2½ as., .....	2	8	0
—	—	48*	Feróz Sháh, at 2 as., .....	6	0	0
—	—	102*	Alá-ud-din, at 1 an., .....	6	6	0
—	—	37*	Umbáarak Sháh, at 3 as., .....	6	5	0
—	—	44*	Tughlak Sháh, at 3 as., .....	8	4	0
MUHUMMAD BIN TUGHLAK.						
—	5	—	Debased Silver Coins, at 2 Rs. dated 727, (729,) 730, .....	10	0	0
—	—	2	Rare <i>Doulutábád</i> Coins, at 2-8, .....	5	0	0
—	—	5	Varieties of Nos. 104 and 105—"Pathán Kings, Delhi," .....	5	0	0
—	—	2	Unpublished varieties, at 4, .....	8	0	0
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15	194	715		766	11	6

Gold.	Silver.	Copper.		Rs.	As.	P.
15	194	715	Brought forward, .....	766	11	6
—	—	4	Three Hasht-Gánís, at 2 Rs., one Do-Gáni, at 5, .....	11	0	0
—	—	55	Selected Coins (many Silver), at 4 as.,...	13	12	0
—	—	23	Ordinary Bronze ( <i>forced currency</i> ), at 2 as.	2	14	0
—	—	1*	Billon Coin, dated 726, A. H. ...	0	4	0
—	—	31*	Feróz Sháh, large Coins, at 6 as., .....	11	10	0
—	—	51	Ditto, small ditto, at 2 as.,.....	6	6	0
—	—	11*	Bahlól Lódi, at 5 as., .....	3	7	0
—	—	38	Sekandar bin Bahlól, at 2 as., ...	4	12	0
—	—	37	Shír and Islám Sháhs, at 2 as., .....	4	10	0
MOGHUL COINS.						
6	—	—	Akber, at 18 Rs.,.....	108	0	0
5	—	—	Jehángir (Libra, Pisces, Taurus) <i>four</i> at 20, one at 18, .....	98	0	0
2	—	—	Sháh Jehán, } at 17 Rs. each, .....	68	0	0
1	—	—	Aurungzéb, }			
1	—	—	Sháh Álum, }			
1	—	—	A small Gold Coin, .....	4	0	0
MOGHUL SILVER COINS.						
—	51	—	Akber's, at 1-2, .....	57	6	0
—	5	—	Jehángir's, 2 Leo, at 4, 2 Capricornus at 8, one Gemini, 10, .....	34	0	0
—	3	—	Ditto in the name of Núr Jehán Bégum, at 7, .....	21	0	0
—	24	—	Ordinary Coins of Jehángir, at 1-2,.....	119	4	0
—	43	—	Sháh Jehán's, at ditto, .....			
—	20	—	Aurungzéb's, at ditto, .....			
—	7	—	Ferókhshír's, at ditto,.....			
—	12	—	Muhummed Sháh, at do., 106 at 1-2, ...			
—	1	—	Morád Buksh, .....	10	0	0
—	18	—	6 Sháh Alem, 12 Md. Akber 2nd, at 1-1,	19	2	0
—	6	—	Bengal Sultáns, at 2-8, .....	15	0	0
—	—	43	Akber's, &c., at 1 an. each,.....	2	11	0
MISCELLANEOUS MOHAMMEDAN.						
—	—	30	9 GHAZNAVIS, at 5 as.; 14 curious and rare Coins, at 4 as.; 7 ditto at 6,.....	8	15	0
—	—	278	Mixed Coins, at 1 an.,.....	17	6	0
THE SUFI RACE, in Persia.						
—	1	—	ISMAIL SUFI very perfect, .....	12	0	0
—	42	—	Silver Coins various, at 14 as., .....	36	12	0
—	42	—	Silver PERSIAN COINS, Nádiris, &c. at 1-2,	47	4	0
—	8	—	Coins Md. Kajar, at 1-1, .....	8	8	0
—	13	—	Small Coins, at 7 as., .....	5	11	0
—	33	—	Miscellaneous Silver Coins, at 9 as.,.....	18	9	0
31	523	1317		1536	14	6

Gold.	Silver.	Copper.		Rs.	As.	P.
31	523	1317	Brought forward, .....	1536	14	6
—	18	—	7 Large and 11 small <i>Futteh Ali Kajar</i> , at 1 R. and 6 as., .....	11	2	0
—	80	—	KABUL Rupees, at 15 as., .....	75	0	0
—	—	158*	Billon Coins of JAUNPORE Dynasty ( <i>three</i> Kings) at 2 as., .....	19	12	0
—	6	60	Malwa Coins, six Silver, at 12 as., and about 60 Billon, at 1 an., say 4 Rs.,...	8	8	0

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31	627	1535		1651	4	6
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## MISCELLANEOUS COINS.

—	1	—	An Oude Silver piece, wg. $7\frac{3}{4}$ tolahs, ...	12	0	0
—	16	—	A paper of Miscellaneous Silver Coins, A, at 6 as., .....	6	0	0
—	—	43	Copper ditto A, at $\frac{1}{4}$ an., .....	0	10	9
—	4	0	Silver Coins, B, at 2 Rs. each, .....	8	0	0
—	—	19	Copper ditto, B, at 2 as., .....	2	6	0
—	3	—	Silver Coins, C, at 2 Rs., .....	6	0	0
			Some Chinese Cash and other Copper Coins, C, .....	1	0	0
			About a seer (2 lbs.) of worn Copper Coins, at 1-4 per seer, .....	1	4	0
—	—	236	A bag containing 236 modern Local pysa, at $\frac{1}{4}$ , .....	3	11	0
—	—	12	Twelve selected Coins, at 3 as., and a bag containing six seers, seven chittaks of Copper Coins, at 1-4 per seer, .....	9	4	9
—	132	—	Miscellaneous Rupees, at 1, .....	132	0	0
—	110	—	Smaller Silver Coins, at 3 as., .....	20	10	0
—	11	—	Small S. Coins (in another packet), at 3 as., .....	2	1	0
—	—	4	Sassanian Coins of rare type, at 8 as.,...	2	0	0
			About half a seer of Copper Coins, at 1-4, .....	0	10	0
—	—	53	Roman <i>second bronze</i> Coins, among them some rare types of Agrippa, Plotina, Faustina the Elder and Faustina the Younger, at 1-4 each, .....	63	4	0
—	—	17	Lower Empire Coins, at 6 as., .....	6	6	0

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277 384

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277 3 6

## Summary.

	Gold.	Silver.	Copper.	Rs.	As.	Pie.
Greek, &c.....	...	352	1,197	728	5	6
Hindu,.....	70	586	1,268	1,303	7	6
Mohammedan, .	31	627	1,535	1,651	4	6
Miscellaneous, .	...	277	384	277	3	6

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Total Coins,...	101	1,842	4,384	3,960	5	0	Total Rs.
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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR MAY, 1858.

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The monthly General Meeting for May was held on the 5th Instant.

The Hon'ble Sir James Colvile, Kt., President, in the Chair.

The proceedings of the March Meeting were read and confirmed, no meeting having been held in April, in consequence of there not being a sufficient number of members present to form a quorum.

Presentations were received—

1. From the Hon'ble the Court of Directors, through the Government of Bengal, two\* sets of Photographic drawings of the ancient buildings at Bejapore.

2. From the Maharajah of Burdwan, a collection of stuffed birds and animals, as described by Mr. Blyth in his list, and a block of fossil wood (the last has not yet arrived).

3. From the Government of Bengal through Mr. Under-Secretary Buckland, the 3rd volume of the Reg Veda Sanhita, edited by Dr. Max Müller, and recently published under the patronage of the East India Company.

4. From Roy Lokenauth Bose, Bahadur, Principal Sulder Ameen, 24-Pergunnahs, a copy of his Bengali treatise on the Hindu Religion.

5. From Colonel Abbott a small Indo-Greek sculpture with the following note:—

\* The Jummah Musjeed and Ibrahim Roza.

“I have the pleasure to present to the Society a piece of Indo-Greek sculpture, representing a man seated on the earth, the left hand supported on the left knee. The only garments are a pair of short drawers and a species of Hessian boot. The features are nobly developed. It has evidently formed part of the freize of a cornice which has rested upon the head.

“To denote the weight thus supported, the neck is far buried in the bust, and the muscles are swollen in volume. It must have been executed before the Greek taste carried by the Macedonians to Ariana had been greatly impaired by the barbarism around.

“I purchased it when in charge of the Hazara of a native, who had found it in an old Fort of the Yoosufzye at the foot of the Mountains.”

6. From the same gentleman a copy of *Pantographia*. The following note accompanied the Book :

“I have the pleasure to send for deposit in the Library of the Asiatic Society, if approved by the Committee, a volume\* which I purchased of a man sent by me into Bokhara and the neighbouring districts to collect coins previous to quitting the Punjaub.

“It is a valuable, I believe, rare, work. But my object in placing it with the Society is to enable any person properly authorized to claim it. It has evidently belonged to the enterprising and sagacious traveller, William Moorcroft.

“It was purchased, so far as I remember, at Cabul. But I could learn from the purchaser no particulars of interest connected with it.

“Should the Volume be not claimed by any authorised person, I make over my interest in it to the Asiatic Society.”

7. From R. Cust, Esq., C. S, copies of his *Lives of Rama, and of Alexander the Great, pamphlets.*

8. From Captain R. Maclagan, Priucipal Roorkee Thomason College, three copies of Dr. Jameison's Report on the Botanical Gardeus of the N. W. P.

9. From a gentleman (name unknown) the first 15 volumes of the Irish Academy Transactions.

\* The *Pantographia*, By Fry.



10. From Dr. A. Weber, a copy of the White Yajur Veda, part III.

11. From the Imperial Academy of Sciences and Belles-Lettres at Dijon, through Mr. Oldham, the Memoirs of the Academy, Volumes 1 to 5, Second series, with an Atlas.

12. From Dr. Falconer through Mr. Oldham, a pamphlet on the description of two species of the fossil Mammalian Genus *Plagiaulax* from Purbeck.

13. From the Geological Society of Dublin through Mr. Oldham, a series of its publications.

A note from Mohamed Hossein Ally Khan, Ex-Ameer of Scinde, conveying his wish to withdraw from the Society, was recorded.

The election of Mr. B. H. Hodgson and Dr. Falconer, as Honorary members of the Society was postponed under rule 6 of the Society's code.

Mr. Sutherland was named for ballot at the next meeting, proposed by Rev. Dr. Kay, and seconded by G. H. Freeling, Esq., C. S. Communications were received—

From Baboo Radanauth Sikdar, an Abstract of the Meteorological Observations taken at the Surveyor General's Office during the months of October to January last.

2. From Mr. Cope a paper on Inscriptions on the public buildings of Lahore.

The Librarian and Zoological Curator submitted their usual reports for the months of March and April last.

Colonel R. Strachey exhibited a model of the exceedingly ingenious apparatus, designed by Mr. Stokes, Locomotive Superintendent of the E. I. Railway Company, by which the motive power of Locomotive Engines is made applicable to drive paddle-wheels of steamers. Several river-steamers have been built under Mr. Stokes' superintendence, and fitted with locomotive engines on this system, and have been found to answer excellently in practice. Colonel Strachey entered into some explanations as to the mechanical principles involved in this apparatus, illustrating his remarks by a model and some diagrams.

## LIBRARY.

The Library received the following accessions during the months of March and April last.

*Presented.*

Rig-Veda-Sanhita together with the Commentary of Sayancharya, edited by Max Müller, Vol. III. 4to. London, 1856.—BY THE HON'BLE THE COURT OF DIRECTORS, THROUGH THE GOVERNMENT OF BENGAL.

Selections from the Public Correspondence of the Punjaub Administration, Lahore, Vol. III. No. 4, 4 copies.—BY THE PUNJAUB GOVERNMENT.

Ditto from the Records of the Bombay Government, No. XLVI. New Series.—Annual Progress Reports of the Executive Engineers in the southern, central and northern Provinces of the Bombay Presidency in 1856-57.—BY THE GOVERNMENT OF INDIA, PUBLIC WORKS DEPARTMENT.

Tables de la Lune, par P. A. Hensen, London, 1857, Royal 4to.—BY THE LORDS COMMISSIONERS OF THE ADMIRALTY.

The Jumma Musjeed at Béejapore, being a Photographic drawing of the Ibrahim Royal.—BY THE HON'BLE THE COURT OF DIRECTORS.

Report of the Results of the Administration of the Salt Department during 1856-57, folio.—BY THE GOVERNMENT OF BENGAL.

Die Germanen und die Romer in ilhren Bechselverhur, *pamphlet*.—BY THE PRUSSIAN ACADEMY OF SCIENCES AT MUNICH.

The Almanac and Companion for the North Western Provinces and the Punjaub for 1858.—BY MR. W. H. CAREY.

Journal Asiatique, Nos. 39 and 40.—BY THE ROYAL ASIATIC SOCIETY OF PARIS.

A Catalogue of the Bibliotheca Orientalis Sprengeriana.—BY DR. SPRENGER.

The Oriental Christian Spectator for January and February, 1858.—BY THE EDITOR.

The Oriental Baptist for March and April, 1858.—BY THE EDITOR.

The Calcutta Christian Observer for March and April, 1858.—BY THE EDITORS.

Abhandlungen der Akademie Historischen Classe, Vol. VI.—BY THE ACADEMY.

————— der, Philosophie Classe, Vol. VI.—BY THE SAME.

Bouverd Tables Astronomiques.—By THE VENERABLE ARCHDEACON PRATT.

Vividharta Sangraha, Nos. 48 and 46.—By BABU RAJENDRALAL MITRA.

Recueil des Actes de L'Académie Imperiale des Sciences, Belles-lettres et arts de Bourdeaux, 3 Trimestre, *Bourdeaux*.—By THE ACADEMY.

Report of the Director of Public Instruction in the Lower Provinces for the half year ending October 1857, *Calcutta*.—By THE DIRECTOR OF PUBLIC INSTRUCTION.

Life of Alexander the Great, known in the East as Sikundar, *Agra*, 1854, *pamphlet*.—By R. CURT, Esq.

Rama the son of Dâsaratha, King of Ajodya, *Agra*, 1854.—By THE SAME.

Transactions of the Linnean Society, Vol. 22, Part 2.—By THE SOCIETY.

Journal of the Proceedings of the Linnean Society, Vol. I. No. 4, and Vol. II., Nos. 5 and 6.—By THE SAME.

List of the Linnean Society.—By THE SAME.

Address of the President T. Bell, Esq. to the Society.—By THE SAME.

Mémoires de l'Académie des Sciences, Arts et Belles-lettres de Dijon. Tome I. to V. Second series, 8vo., with an Atlas of Plates, 4to.—By THE ACADEMY.

Description of two species of the fossil Mammalian Genus *Plagialax* from Purbeck.—By Dr. H. Falconer, *pamphlet*.—By THE AUTHOR.

Journal of the Geological Society of Dublin, Vol. II. Parts 2 and 3, Vols. III. to VI. 8vo.—By THE ACADEMY.

Address at the 3rd and 5th Anniversaries, *pamphlets*.—By THE SAME.

Journal of the Statistical Society of London, Vol. XXI. Part I.

Selections from the Records of the Madras Government, No. XLVI. Report on Civil Dispensaries for 1856.—By THE MADRAS GOVERNMENT.

Magnetical Observations made at the Hon'ble East India Company's Magnetical Observatory at Madras, 4to.—By THE SAME.

Speech of Col. Sykes in the House of Commons on February 18, 1858, on the proposed India Bill, *pamphlet*.—By THE AUTHOR.

Report on the Revenue Administration of the Lower Provinces for the year 1855-56, *pamphlet*.—By THE GOVERNMENT OF BENGAL.

Report on the Botanical Gardens of the Government, N. W. Provinces, by Dr. W. Jameson, *Roorkee*, 3 copies, 1855, 4to.—By THE GOVERNMENT OF THE N. W. PROVINCES.

Pantographia containing accurate copies of all the known alphabets in the world; together with an English explanation of the peculiar force or

power of each letter, to which are added specimens of well authenticated oral languages forming a comprehensive digest of Phonology. By E. Fry, 1799, 8vo.—BY COL. ABBOTT.

Report (35th) Annual of the Parental Academy or Doveton College, *pamphlet*, 1858.—BY THE SECRETARY TO THE DOVETON COLLEGE.

A Treatise on the Mysteries of Hindu Religion in Vernacular, by Babu Lokenauth Bose, *pamphlet*.—BY THE AUTHOR.

*Exchanged.*

Athenæum for December and January, 1858.

The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science, Nos. 97 and 98.

Annaler der Chemie und Pharmacie, November, 1858.

*Purchased.*

American Journal of Science and Arts, Vol. XXV. No. 73.

Literary Gazette, Nos. 2135 to 2139.

Annals and Magazine of Natural History, Vol. 1, Nos. 1 and 2, 3rd series, supplementary No. for December, 1857.

Annales des Sciences Naturelles, Tome VII. Nos. 3 and 4.

Description de L'Assique Septentrionale par Abon-obeid-eb-Rekri, 1857, 8vo.

Comptes Rendus, Nos. 23 to 26, December 1857, Nos. 1 to 5, January to 1st February.

Tables Ditto, Tome XLIV. 1857.

Edinburgh Review for January, 1858, No. 217.

Journal des Savants for November, December, 1857, and January, 1858.

Die Orientalischen Münzen des Akademie Münzenbenets in Kongsberg on E. H. F. Neplman, *Liepzig*, 1858.

Revue des Deux Mondes, January and February, 1st and 15th, and 1st March, 1858.

— et Magasin De Zoology, Nos. 11 and 12, March 1857.

The Natural History Review, Vol. V. No. I. January 1858.

The Quarterly Review, No. 205, January 1858.

Atharva Veda Sanhita von Roth und Whitning, Erste Abth.

GOURDASS BYSA'CK,

*Librarian and Asstt. Secy.*

*The Asiatic Society's Rooms,*

1st April, 1858.

*Report of Curator, Zoological Department, for May, 1858.*

1. Dr. G. von Liebeg, having kindly permitted a native collector in the pay of the Society to accompany him, in his recent visit to the new penal settlement at Port Blair, on the eastern coast of the southern island of Great Andaman, I have now much pleasure in reporting on the specimens that were obtained by him and by Dr. Liebeg himself, under circumstances of considerable difficulty.

In the class of mammalia, there are only a human bone and some skulls of the undescribed wild Hog of the Andamans.

The bone is the left femur of probably an adolescent female. Length  $14\frac{1}{4}$  in., by  $2\frac{5}{8}$  in. in circumference at middle of trunk; the epiphyses imperfectly anchylosed. It is charred throughout; having been found among the smouldering remains of a recently fired village.

On the same occasion were found the following bones of the wild Hog.

1. Skull of an adult boar, wanting the tusks and lower jaw.
2. Lower jaw of a rather larger boar, with the series of teeth complete.
3. Skull of an adult sow, with teeth in lower jaw complete, and the upper series wanting only some of the incisors.
- 4, 5. Skulls of adolescent sows.
- 6, 7. Heads wanting lower jaw, of adult sows.
8. Lower jaw of adolescent sow.
9. That of a younger individual.

All of these skulls are daubed over with regular stripes of red ochre, and had been hung up as trophies in the huts of the natives.

*SUS ANDAMANENSIS*, nobis, *n. s.* Seemingly akin to the *S. PAPUENSIS* of New Guinea, and to Mr. Hodgson's Pigmy Hog of the Nepal sâl-forest, which he terms *PORCULA SALVANIA*. The entire length of the skull of an adult male, from occiput to tip of the upper jaw, is only  $10\frac{1}{4}$  in.: breadth at zygomata  $4\frac{1}{2}$  in.: palate to tip of intermaxillaries, 6 in.: series of molars six (properly seven, the first having been displaced by the growth of the tusks, which are shewn by the shape of their sockets to have been large and abruptly curved outward and upward); longitudinal diameter of the tusk-sockets  $\frac{3}{4}$  in.: series of six grinders  $3\frac{1}{4}$  in.: from tusk-socket to tip of intermaxillaries,  $1\frac{7}{8}$  in.: breadth of occiput above, where narrowest, 1 in.; and of bony palate, 1 in. The lower jaw of a rather larger male measures  $8\frac{3}{8}$  in. to tip of incisors; and height to summit of coronoid process,  $3\frac{5}{8}$  in.: the tusks project  $1\frac{3}{4}$  in., as in the Indian boar, and are proportionately robust and keen-edged: series of six grinders  $3\frac{3}{8}$  in., thence to the tusk 1 in., and midway, a little nearer the tusk, is situate a small præmolar: the hindmost grinder is longer, in its antero-posterior diameter, than the penultimate by only one-half; and in the upper series

the hindmost is scarcely larger than the penultimate. This lower jaw is that of a fully grown boar, whose hindmost molars had long been brought into wear: in the other the hindmost molars are fully developed, but are not abraded.

Of the sow, there are three skulls of fully adults, with the hindmost molars worn; but one only has the lower jaw: in this, the upper plane of the occiput, where narrowest, is only  $\frac{1}{2}$  in.; being in the two others  $1\frac{1}{8}$  in.: the series of grinders is seven above and below; the tusks small, as in *S. INDICUS*. In other respects they resemble the boar skull, except in being smaller: length, from occiput to tip of intermaxillaries,  $9\frac{1}{2}$  in.; and greatest width, at the zygomata, 4 in.

From the size of the skull of the adult boar, it may be estimated that this animal would not exceed 15 in. in height, if indeed it is even so high at the shoulder. The skull is much less elongated anterior to the orbit than in ordinary Swine, that portion occupying somewhat less than three-fifths of the entire length. Profile a little concave anterior to the eyes, the forehead bulging into a convexity.

It is probable that the same species inhabits the Coeos islets, lying north of the Great Andaman, and also the group of the Nicobars to the south; though on the Great Coco it would appear that Hogs have only been recently introduced by the Burmans, and may therefore be of a domestic race derived from the continent. I have long had reason to suspect that the Hogs of at least the Andaman islands would prove to be of a peculiar species, and therefore called Dr. Liebeg's attention particularly to the subject. The Rev. J. Barbe describes the Nicobar Pigs as being apparently derived from the Chinese, and says nothing of their being of a diminutive size:\* moreover they appear to be domesticated; but so, I believe, are a few of the *SUS PAPUENSIS* in N. Guinea. Proceeding to the south and east, according to Dr. S. Müller, the *SUS VITATUS* inhabits Sumátra, with Jáva and Banka; *S. VERRUCOSUS* also inhabits Jáva; *S. BARBATUS*, Borneo; *S. CELEBENSIS*, besides the Babarussa (which is also in Buru and Ternate), Celebes; *S. TIMORIENSIS*, Timor and Rotti; and *S. PAPUENSIS*, New Guinea: a goodly series of wild swine, to which we now add the *S. ANDAMANENSIS*, which needs comparison most with *S. PAPUENSIS*.

The wild Hogs of the mainland of Asia have not yet been properly determined. They are found at all habitable elevations, and in all climates.

\* *J. A. S.* XV, 352. In Mr. H. Busch's 'Journal of a Cruise amongst the Nicobar Islands,' it is remarked that, in Teressa, "the jungle abounds with wild Pigs, which afford the islanders both sport and provisions."



Those of Siberia and Tartary (in the most extended sense of the latter appellation) are probably identical with *S. SCROPIA* of Europe; perhaps also those of Persia and Afghanistan:\* but there would seem to be more than one race in India, to judge from the skulls; and while the ordinary Indian wild Hog is also that of Ceylon, our museum contains a skull from that island which considerably resembles the skull of *S. BARBATUS*, (as figured by Dr. S. Müller); this is the *S. ZEYLONENSIS*, nobis, *J. A. S. XX*, 173. The ordinary wild Hog of India is designated *S. INDICUS* by Gray (being also *S. CRISTATUS*, Wagler); but the distinctions from *S. SCROPIA* mentioned by Dr. Gray are not very satisfactory;† and he also indicates a *S. AFFINIS* from the Nilgiris.‡ The countries eastward are likely to yield some peculiar species, even to the south of China: but the only peculiar Hog as yet properly determined from the whole mainland of Asia is Mr. Hodgson's tiny *PORCULA SALVANIA*.

Of birds, twelve species were obtained, one of which is a beautiful new *Sháma*.

*KITTACINCLA ALBIVENTRIS*, nobis, *n. s.* Differs from *K. MACROURA*, (L.) in its colouring, and in form of tail, the four middle feathers of which extend little beyond the next pair, and the medial pair but  $\frac{3}{16}$  in. (instead of commonly 2 in., as in the other). Abdominal region, vent, tibial plumes, and inside of the wing anteriorly, pure white, like the upper tail-coverts in both species; the hindmost portion of the flanks, and the lower tail-coverts, only, being deep ferruginous: four pairs of outer tail-feathers more deeply tipped with white than in *K. MACROURA*: in other respects resembling that species; being a true *Sháma*, as distinguished from a *Dhyal* (*COPSYCHUS*). Length of wing  $3\frac{1}{2}$  in., and of tail  $4\frac{1}{4}$  in. A third species of this genus, as distinguished from the nearly allied African genus *CERCOTRICHAS*, exists in the *K. LUZONIENSIS* (*Copsychus luzoniensis*, Kittlitz), of the Philippines.

The other species of birds from the Andamans are—

*HALCYON COROMANDELIANUS*, (Scopoli).

*H. SMYRNENSIS*, (L.)

*CORVUS CULMINATUS*, Sykes.

*STURNIA ERYTHROPYGIA*, nobis. The only specimen has the upper and lower tail-coverts, with the rump and tips of the tail-feathers dull white, instead of deep ferruginous; but there is a faintly perceptible shade of

\* Since writing the above, I have been assured of the existence of three most distinct species of wild Hog on the plains of Mesopotamia.

† *Vide Proc. Zool. Soc.* 1852, p. 130.

‡ *List of the Osteological specimens in the Collection of the British Museum.*

the latter, which I doubt not is fully developed in other Andaman examples. Heretofore only known from the Nicobars.

TEPHRODORNIS GRISOLA, nobis. This species we have also from Calcutta, Arakan, Pinang, and Java; so that it has probably been named by the late Professor Temminck.

GEOCICHLA INNOTATA, nobis. Discovered in the Nicobars, and subsequently obtained in Province Wellesley.

COPSYCHUS SAULARIS. (L.) Undistinguishable from Bengal specimens.

ARTAMUS LEUCORHYNCHOS, (L.) Badly so named; for the bill is of a fine blue.\*

EDOLIUS —? The Malayan species of *Bhim-ráj*, with rudimentary frontal crest.

PYCNONOTUS JOCOSUS, (L.) The Burmese and Pinang variety, with shorter and deeper-coloured crimson ear-tufts than in the Indian race.

CARPOPHAGA SYLVATICA, Tickell (*C. anea* of India, auctorum, and of Sumatra apud Raffles). Two fine specimens, quite similar to the continental race on either side,—*i. e.* differing from the marked peculiar race of the Nicobars,—*C. INSULARIS*, nobis.†

In the class of reptiles, a species of *VARANUS* was procured, but circumstances did not permit of its preservation.

In that of fishes, the most remarkable is a curious new genus of the Blenny group, with broad expanded pectorals, thrown out as in the Loches of the genus *HOMALOPTERA* (apud Bleeker, *Balitora*, Gray, *Platyicara*, McClelland):—

ANDAMIA, nobis, *n. g.* Form elongated, with large expanded pectorals and caudal, and a long serrated anal which is also permanently expanded; the ventrals short, even with the pectorals, and consisting each of an outer simple ray and an inner divided ray, which are separated nearly to the base. Head depressed, with rather small eyes, placed vertically, and distantly apart; the mouth opening downward, and furnished with a remarkable labial apparatus: in front it is covered by a thin overflapping upper lip, which is connected laterally by a plicature with a fold or flap of membrane underneath, at a short distance from the mouth behind it: minute marginal teeth in both jaws, which are perceptible to the touch as a slight asperity. Dorsal fin extending the whole length of the back,

\* The alleged new Indian species of *ARTAMUS*, described by Dr. Nicholson in the *Proc. Zool. Soc.* 1851, p. 195, by the name *A. cucullatus*, seems to be no other than *CAMPEPHAGA SYKESI*, Strickland!

† The *CHALCOPHAPS* of the Nicobars appears to be *CH. AUGUSTA* of the late Prince of Canino.

becoming higher on its posterior half; its spinous and soft rays not easily distinguishable, and the second and third rays are a little elongated in the males (at least of the species described, which also has a small pal-mated appendage over each eye).

A. EXPANSA, nobis, *n. s.*

D. 36.—V. 26.—P. 14.—C. 11.

Colour dark plumbeous above, with slight pale mottled transverse bands on the sides: the gill-covers studded with minute dusky specks: dorsal fin dusky; the ventral surface and anal fin whitish, with a dark spot on each ray of the latter: membrane of the tail colourless, with conspicuous black rays; the caudal rays extending beyond the membrane: the tail having a rounded form, and being almost continuous below with the anal fin. In a young individual, the dorsal fin is pale, with the exception of the first two rays, which are black. In adults the pectorals and posterior half of the dorsal are marked (more or less distinctly) like the caudal, black rays on colourless membrane: ventrals pale. Length  $3\frac{3}{8}$  in.

SALARIAS OLIVACEUS, nobis, *n. s.* One of the crested species of this genus, having also a small appendage over each eye.

D. 12-19.—V. 22.—P. 13.—C. 12.

General colour dark olive-green, paler below, and also on the hinder half of the body, where inclining to dull reddish: a few obscure dark spots along the back, at base of the dorsal fin, not visible in all specimens, and some minute black specks also towards the tail. Length  $3\frac{1}{4}$  in.

PERIOPHTHALMUS FUSCATUS, nobis, *n. s.* Pectorals rather large: ventrals deeply divided: anterior dorsal moderately high, with no elongated filaments: caudal pointed, and as if obliquely truncated below.

D. 12-13.—V. 11.—P. 11.—C. 17.

Colour dusky leaden-brown above, obscurely mottled; the lower-parts pale: the two dorsal and the caudal fins speckled with black; the pectorals less distinctly so; and the ventrals and anal spotless: on the gill-covers are a few white specks; and the sides of the body are obscurely marked with numerous small black spots. Length  $3\frac{1}{4}$  in.\*

GOBIOUS BREVICEPS, nobis, *n. s.* A small nude-headed Goby, with the eyes placed remarkably forward, imparting somewhat of a *feline* aspect to the visage. Fins ordinary, or presenting no peculiar character.

D. 6.—1-9.—A. 1-8.

Colour a pale red-brown, with a row of large blackish spots along the

\* We have a small PERIOPHTHALMUS from Mergui, which, in its colouring, approximates the P. ARGENTILINEATUS, C. and V., but has merely a slight infuscation of the first dorsal. D. 9-13.—V. 12. If distinct, P. SCINTILLANS, nobis.

side from pectoral to caudal, tending rarely to form a continuous band, above which the back is irregularly freckled with dusky specks of different sizes: the two dorsal and the caudal fins are also minutely speckled with dusky; the other fins and the lower-parts pale and spotless. The largest of several specimens measures  $1\frac{7}{8}$  in.

*G. CORYPHENULA*, Valenciennes. This curiously formed species appears to be very common both at the Andamans and Nicobars, frequenting the coral-reefs.

*APOGON QUINQUEVITTATUS*, nobis, *n. s.* About 1 in. in length, with four vertical black bands, a fifth at base of tail, and the occipital region also of this colour. Form compressed; the mouth small; scales also small, numbering about 24 to end of lateral line, which terminates at the posterior base of the second dorsal fin, and 3 rows above and 10 below the lateral line, downward from the first dorsal. Eye large, occupying two-fifths of the vertical height of the head.

D. 13—10.—A. 3-9.—P. 15 (?).—V. 5.

Pectorals reaching beyond the second lateral band; the posterior dorsal and the anal fins projecting similarly as far as the base of the tail-fin.

*MICROPHIS TENUIS*, nobis, *n. s.* A very slender *Syngnathous* fish, with 16 body and 36 caudal rings, and dorsal fin upon the first 7 caudal rings.

D. 24?—P. 16?—C. 9?

Snout half the length of the head, and scarcely more compressed than the neck; body slightly heptangular, the two dorsal angles alone strongly marked; tail quadrangular, and nearly twice as long as the head and body. Dorsal aspect unmottled brown; the other facets of the body (between the angles) marked, more or less distinctly, each with a white band, the continuity of which is broken at the rings: on the tail similar markings are but slightly indicated: no silvery appearance at the gill-covers. Described from two female specimens, the longer of which measures nearly 4 in.

Of *Mollusca*, 22 marine species were procured; but all of them are well known kinds, common in the Bay, and which need not therefore be enumerated.

Among the *Crustacea* are five specimens of a magnificent land-Crab, which sufficiently agrees with the description of *CARDISOMA CARNIFEX*, (Herbst.), by Milne Edwards; but which are nevertheless probably distinct and new, as no land-Crabs approaching them in size seem to be known on the peninsula of India. There are two marked varieties (one of them probably the result of former mutilation of a claw), each attaining to above 3 in. across the carapace. In one of these varieties the claws of the male are excessively unequal, and the huge nippers of the great

claw (which in three specimens sent is on the dexter side) are armed at the middle (typically) each with an enormous tooth. In the other variety the claws are unequal in the male (the left being rather the larger in the specimen sent), and quite equal in the female,—in both sexes much exceeding in size the small claw of the male of the other variety. There is also a marked difference in the colouring of the claws; those of the second variety being weaker in hue,—whence not improbably the whole difference may depend on the latter having cast and renewed the organ. In *GELASIMUS* and other Crabs with very unequal claws, the big one is as often on the right side as on the left. From the size and seeming abundance of this fine land-Crab, it is probably much eaten by the Andamaners.

A fresh-water species sent is the female of a new genus akin to *VARUNA*, remarkable for the small size and nearly round form of the last articulation to the tail, which is placed within a notch of the penultimate articulation, that accordingly half surrounds it, and is the largest of the series.

Other species of Crabs sent are a new *ZOZYMUS* (since received also from Ceylon), *ERIPHIA TUBERCULATA*, nobis, *n. s.* (common on the Burmese coasts), *TRAPEZA FERRUGINEA* (? Latr.), *PILUMNUS VESPERTILIO*, *GRAPSUS STRIGOSUS*, *GR. MESSOR*, *SESARMA TETRAGONA*, *CÆNOBITA RUGOSA*, *C.* —, a *PAGURUS*, and *GONODACTYLUS CHIRAGRA* of the *SQUILLA* group.

A species of Scorpion and *SCOLOPENDRA MORSITANS* are also sent; and of *Radiata* a species of *COMATULA*, two of *OPHIOCOMA*, one of *ECHINUS*, a *HOLOTHURIA*, and a *SIRINX* (?). Several interesting forms likewise of *Annelides*.

2. E. F. Kelaart, Esq., M. D., Trineomali. To this gentleman we are indebted for a very interesting series of marine Crabs, amounting to 15 species, with specimens of *OPHIOCOMA*, *OPHIURA*, *URASTER*, *ASTERINA*, &c. Also a *FILARIA* from the ovaries of the Pearl Oyster.

3. I have next to announce the presentation of a large collection of stuffed specimens, from his highness the Máharája of Burdwan. This collection contains numerous duplicates, and some very acceptable specimens—especially one or more undescribed species of mammalia, so far as I have been able to discover.

Of *Quadrumana*, adult male and female of the Mandrill (*PAPIO MAIMON*), and a young male of the Drill (*P. LEUCOPHÆUS*),—well set up: a Monkey, also, which I take to be the *INUUS ASSAMENSIS* (*v. pelops*); and other species with which we have long been well supplied. Two kinds of Lemur are sent; one the *L. ALBIFRONS*, Geoffroy; and the other is probably—



*L. FLAVIVENTER*, Lesson (*Rev. Zool. &c.*, 1851, p. 24). In this case, however, the remarkable colouring of the face is unnoticed by its describer. The face and between the eyes are black; but the broad bilobate band above the eyes of *L. NIGRIFRONS*, is in the present species grizzled with fulvous-white, vaguely divided by blackish along the middle, and the latter continued as a more distinct black line from the vertex to the occiput; the periphery also of the greyish frontal band is dusky-black. Fur more dense and frizzled than in *L. NIGRIFRONS*, especially upon the head: of a nearly uniform dull grizzled fulvous-brown on the upper-parts, limbs, and tail; palest on the limbs, but darker towards the anterior hands, and the digits light fulvescent: below dull fulvescent-white, purer white on the chin and throat, and passing to deeper fulvous towards the tail, and likewise on the fore-limbs towards the palms; some pale colour also on the cheeks, and the fur upon the ears; and the moustachial bristles black. Size rather exceeding that of *L. NIGRIFRONS* and *L. ALBIFRONS*.\*

A species of *PARADOXURUS* would seem to be *P. LANIGER*, Hodgson; but with the woolly fur much shorter (as produced in confinement), only  $\frac{1}{2}$  in. long upon the body, and *Lemurine* or Bat-like in character, close and frizzled: but the relative proportions of the tail and body do not agree, this having the tail about equalling in length the head and body; whereas in *P. LANIGER* it is described to be "barely more than a third of the entire dimensions." The prevailing colour of the fur is a maroon-brown, grizzled with hoary tips; darker on the head, occiput, cheeks, and ears; and a narrow median white line along the nose: paws also darker, especially those of the hind-feet, and the terminal third or more of the tail: lower-parts whitish, passing up the sides of the neck so as almost to form a collar: the whiskers long and black: ears naked within, and nearly so for the terminal half externally: no dark lines along the back; but a vague appearance of a broadish fulvous streak along the middle of the back. Length about 32 in., of which the tail is half (or very nearly so): head 4 in.; and hind-feet from heel,  $2\frac{3}{4}$  in.

Here may likewise be noticed—

*P. LEUCOTIS*, nobis (Horsfield's Catalogue). Length about 3 ft., of

\* We have now the following species of this genus:

1. *L. MACACO*, L.: the Ruffed Lemur.
2. *L. CATTALIS*, L. The Ring-tailed Lemur.
3. *L. NIGER*, L. The Black Lemur.
4. *L. ALBIFRONS*, Geoffroy. The White-fronted Lemur.
5. *L. NIGRIFRONS*, Geoffroy. The Black-fronted Lemur, with skeleton.
6. *L. FLAVIVENTER* (?), Lesson. The Grey-fronted Lemur.

which the tail is half. Fur dense and woolly at base, but with long straight hairs intermixed: the prevailing colour pale dull yellowish or fulvous-brown, with three blackish dorsal streaks; below paler, more or less albescent: a white streak on the nose to between the eyes; and the ears black at base, with the terminal half flesh-coloured and scantily furnished with white hairs: crown more or less dusky, grizzled with whitish; and the paws and terminal half (or nearly so) of the tail blackish. Whiskers long and black. Inhabits the Burmese countries (Arakan, Tenasserim, &c.); and is said to be found likewise in Sylhet.

*P. RUBIDUS*, nobis, *n. s.* A large species, of a prevailing deep maroune colour, with black paws and terminal third of tail; the nape also blackish: no dorsal stripes or spots: a whitish band across forehead, extending broadly in front of the ears; and a duller white streak upon the nose, passing to pale ruddy on the forehead: ears black externally: whiskers conspicuously white: lower parts paler; but the fore-part and sides of the neck blackish, with a pale lateral streak continued downward from the white in front of the ears. Fur rather coarse, obscurely grizzled, with dusky-grey woolly pile at base. Entire length about 44 in., of which the tail is 18 in.: hind-foot from heel  $3\frac{1}{2}$  in. A broad pure white tail-tip in the specimen, which was purchased already stuffed; the individual having its nape much abraded from being tied up when alive. *Hab.* — ?\*

Among the mammalia sent by the Máharája of Burdwán, are a stuffed Tiger, 8 Leopards, and 9 Bears, an albino Jackal, † 2 Ratels, *ARCTONYX COLLARIS*, numerous *TRAGULI* (or 'Mouse Deer'), with various others unnecessary to particularise, and 5 species of Kangaroo, three of which are new to our museum, *viz.* *HETEROPUS PENICILLATUS*, *BETTONGIA PENI-*

\* Of this genus we have now 8 species, counting *MUSANGA* and *typus* as one, and excluding the *DERBIANUS* as not properly appertaining to it.

1. *P. RUBIDUS*, nobis, *ut supra.* *Hab.* — ?
2. *P. GRAYII*, Bennett: *P. nipalensis*, Hodgson. *Hab.* Himaláya, and mountains of Arakan. One specimen from the latter locality has the entire tail fulvous-white.
3. *P. LANIGER* (?), Hodgson, *ut supra.* *Hab.* Himalaya?
4. *P. LEUCOMYSTAX*, Gray: *Amblyodon auratus*, Jourdain. *Hab.* Malayan peninsula, &c.
5. *P. ZEYLONICUS*, (Schreber). *Hab.* Ceylon.
6. *P. LEUCOTIS*, nobis, *ut supra.* *Hab.* Burmese countries.
7. *P. TRIVIRGATUS*, Reinwardt. *HAB.* Malayan peninsula, &c.
8. *P. MUSANGA*, (Marsden): *P. typus*, F. Cuv. *Hab.* India, Burma, and Malay countries.

† We have specimens of the Jackal in the museum,—pure white, coal-black, and bright rufous.



CILLATA, and a large species of LAGORCHESTES, which cannot be identified with any one of the four described by Mr. Waterhouse.

L. GYMNOTIS, nobis, *n. s.* Most nearly akin to L. CONSPICILLATUS, Gould; but much larger, a stuffed female measuring about  $2\frac{1}{2}$  ft. from nose to base of tail, and the tail 16 in. : the skin may be distended; but the following admeasurements can be better depended on: ears externally  $1\frac{3}{4}$  in. (more when fresh); palm to tip of middle claw  $1\frac{7}{8}$  in., the claw  $\frac{1}{2}$  in.; tarse to tip of longest claw  $5\frac{3}{4}$  in., the claw 1 in.; from muzzle to base of ear  $4\frac{1}{2}$  in. Muzzle as in L. CONSPICILLATUS: ears naked within. Prevailing hue rufous-brown, grizzled with dull white; each hair white towards the end, with a black tip: limbs more rufescent: under-parts dull rufescent-white throughout: from the mouth proceeds a dark chocolate-brown line or ill-defined band, contrasting with the white of the throat; and a similar vague band passes from the nostril to the eye, which latter is surrounded with dark hairs: chin also dark: the hairs of the tail are excessively abraded in the specimen, save chiefly a median line underneath; and they seem naturally to be very short, and scanty above and laterally: there is an exceedingly slight indication upon the haunches of the pale band of L. CONSPICILLATUS. *Hab.* — ?\*

Of the specimens of TRAGULUS (or 'Mouse Deer') under examination, four (if not five) species are distinguishable,—in addition to the MEMINNA INDICA.

1. TRAGULUS KANCHIL, (Raffles); of which *Moschus fulviventis*, Gray, is a common variety. This is by far the most abundant species, and its range of distribution extends northward into the Tenasserim provinces. Fourteen specimens are before me, besides an albino. It is constantly dis-

\* The Society's museum now contains the following species of MACROPODIDÆ.

1. MACRUPUS GIGANTEUS, (Zimmerman). Young male, and skeleton of the same; with skull of an older individual.

2. LAGORCHESTES GYMNOTIS, nobis, *ut supra*.

3. HALMATURUS RUFICOLLIS, (Desmarest). Adult male and female, skeleton of latter, and skull of a younger specimen.

4. H. BENNETTII, Waterhouse. Adult male and female, with skeletons, and skull of a younger individual.

5. H. UALABATUS, (Lesson and Garnot). Stuffed male, and skull.

6. H. DERBIANUS, Gray. Stuffed male and female.

7. H. BILLARDIERI, (Desmarest). Skeleton, with skin of head and neck.

8. HETEROPUS PENICILLATUS, (Gray), *ut supra*. Stuffed female.

9. BETTONGIA PENICILLATA, Gray, *ut supra*. Male.

10. B. CUNICULUS, Ogilby. Skull only.

tinguished from all the rest by the median dark line between the fore-legs : neck rufous, with a median dark nape-band strongly defined. A rufous hue commonly pervades the entire lower-parts, with the exception of the white on either side of the pectoral line ; and this white with its medial dark streak extends more or less backward, in proportion as another white streak is continued forward on each side of the belly from behind.

2. TR. PELANDOC (?); *Moschus pelandoc* (?), Ham. Smith: *Tr. affinis* (?), Gray. This species accords better than any other with Buffon's figure of *le Chevrotain de Java*. It is smaller than the Kanchil, with a conspicuously shorter head and larger eye: also smaller accessory or succentorial hoofs. The head and neck are very differently coloured ; and the hue of the body is more uniformly rufous and much less nigrescent than in the Kanchil, each hair, however, being black-tipped. Head of adult male from base of ear to muzzle  $3\frac{1}{2}$  in.; from eye to muzzle  $1\frac{3}{4}$  in.: the corresponding dimensions in an adult male Kanchil being  $3\frac{7}{8}$  in. and  $2\frac{1}{2}$  in.: from hock to point of succentorial hoof  $3\frac{3}{8}$  in. in the present species,  $3\frac{5}{8}$  in. in the Kanchil. Head rufous, with a strongly marked dark patch on centre of forehead, contrasting much with the broad rufous superciliary mark ; but the black of the forehead faintly continued as a nape-streak, whereas in the Kanchil the contrast of the same colours is transferred to the nape. In our present species, the throat is white, continued into three stripes down the front of the neck, which alike terminate in a pale fulvescent cross-band: the rest of the under-parts white, with merely a fulvous tinge on centre of belly: back and sides of the neck, with the two dark bands in front which alternate with the three white ones, of a peculiar *and similar* grizzled colouring, contrasting much with the rufous of the body; the former being constantly rufous, and the latter more or less nigrescent, in the Kanchil: tail bright rufous above, white below and at the tip: limbs also bright rufous. Tusk protruding about  $\frac{2}{16}$  in. in the specimen described.

3. TR. JAVANICUS, (Pallas). An adult male and female which I refer to this species, as described by Dr. J. E. Gray in the *Proc. Zool. Soc.* for 1836, p. 64, are remarkable (more especially the female) for the blackish hue of the whole neck, and of the two dark streaks alternating with the three white ones in front of it. General colour rufous, the black tips to the hairs shewing much; the breast, and towards the hind-legs, white, separated by fulvous which occupies the medial region of the belly, extending quite across it. From hock to point of succentorial hoof 4 in.

4. TR. JAVANICUS, var. STANLEYANUS; *Moschus Stanleyanus*, Gray, *P. Z. S.* 1836, p. 65. I take this to be merely a variety of the last, having

the neck, and the marks in front of it, bright chesnut-rufous. The general colouring also is less nigrescent; and one female has a strongly defined dark line from eye to nose, and another along middle of nose, separated by a contrasting pale space. A male and two females are before me.

5. TR. FUSCATUS, nobis, n. s.: *Meminna malaccensis* (?), Gray, *Brit. Mus. Catal.* Larger than TR. JAVANICUS; an adult female measuring, from hock to point of succentorial hoof,  $4\frac{1}{2}$  in. General hue whitish, with prevailing dusky tips to the fur: beneath wholly white: neck of the same hue as the body, but with a dark nape-streak commencing from the forehead, and the usual white markings in front, alternating with the two dark ones, which are broad and nigrescent. Perhaps a third variety of the JAVANICUS; but, if so, a very distinct one. *Hab.* — ?

The second species, however, which I have doubtfully assigned to TR. PELANDOC, is most assuredly no variety of the Kanchil; and I do not in the least hesitate to regard it as a well characterized species.

The birds comprise numerous Lories, Cockatoos, and other Parrots; of which the following are new to the Society's museum. EOLOPHUS PHILIPPINARAM, (Gm.), LORIUS CYANAUCHEN, Muller,\* and CHALCOP-SITTA NOVE GUINEE: also 2 Emeus, 3 Swans, 3 *Súrás* Cranes, a couple of white Crows, a white (or rather *lutino*) 'Hurrial' or fruit-Pigeon (OSMOTRERON BICINCTA), sundry *Gallinaceæ*, and others which need not be particularized: the only novelty being two specimens (old and young, in very bad condition,) of the PHAPS HISTRIONICA, (Gould). The following Australian species are, however, worthy of notice, as having evi-

\* SYN. *L. superbus*, Fraser; but the *L. LORY*, (*L. v. tricolor*, Stephens,) is subject to so much variation, that I have great doubt if the present bird is more than an occasional variety of it. The principal difference is, that this is blue under the wing (brighter than in *L. DOMICELLUS*), whereas *L. LORY* is usually red under the wing: there is also an unusual amount of red up the back, and the blue of the hind-part of the neck is particularly brilliant; but the latter varies much in brightness in different specimens of *L. LORY*, as do also the relative proportions of the blue and red both above and below,—some having nearly the whole under-parts blackish-blue, passing to vivid prussian-blue posteriorly, and others being crimson as far back as the thighs, with various intermediate phases. This particular specimen of CYANAUCHEN has lost many of its upper nape-feathers, so that it cannot be ascertained whether the usual red occipital band had been present; but I observe that some of the black feathers of the hindmost part of the cap are partly red at base. I repeat my doubt that it is more than an occasional variety of *L. LORY*.

dently been set up from cage specimens brought alive to this country—  
*PTILINORHYNCHUS COOKII* and *ENTOMYZA CYANOTIS*.\*

The reptiles are *CROCODILUS PALUSTRIS* and *GAVIALIS GANGETICUS*.

While describing new or little known birds, I may here bring to notice a Pheasant, of remarkable beauty, four living specimens of which (all males) have recently been obtained by Babu Rajendra Málíka for his

\* The following, if not the *EOS RICINIATA* or *E. SEMILARVATA*, Bonap., descriptions of which I have not seen, would appear to be a new species of Lory.

*EOS FUSCATA*, nobis, *n. s.* (?) Structure typical. Length of closed wing 6 in. Prevalent colour brown-black, the rump-feathers marginal with dull-white, those of the nape with ruddy-brown, and of the breast with bluish-grey: a dull orange band across the crown, from eye to eye, perhaps typically crimson, a crimson band crossing the upper and another crossing the lower part of the breast; the abdominal and tibial feathers also crimson, and the flanks and lower tail-coverts dull purple-black: tertiaries ruddy-brown, perhaps brighter in fine specimens: a large ruddy-yellow spot on the inner web of each primary, as seen from above in the spread wing; and the unspread tail dull ruddy-brown above, with a shade of blue at tip, all but its middle feathers having the inner web crimson to near the tip: under surface of the wings chiefly yellowish-red. HAB. — ?

*TRICHOGLOSSUS OCHREOCEPHALUS*, nobis, *n. s.* Size and structure of *TR. CHLOROLEPIDOTUS*, (Kuhl). Upper-parts uniformly vivid green; the lower yellowish, passing on the belly and flanks to pure yellow with green tips: crown, ear-coverts, and cheeks, ochreous-yellow, streaked: a broad pure yellow band on the under-surface of the wing, on the inner webs of the primaries and secondaries. Length of closed wing 5 in. HAB. — ?

The following is perhaps but a cage variety of *TR. HÆMATODUS*, (L.); unless that the tail is more developed, attaining to 5 in. and upwards. The red of the breast and beneath the wing in *HÆMATODUS* is replaced by glowing yellow, faintly tinged with red towards the centres of most of the feathers: a slight admixture of red also on the axillaries and on the under-surface of the wing: pectoral feathers without dark margins, or with obscure traces of green terminal edges, chiefly towards the flanks: abdominal patch green, with very slight admixture of blue: the blue of the forehead and cheeks dull and little extended; and the occiput green, above the greenish-yellow nape-band: no yellow at base of inter-scapularies, abruptly defined, as red in *HÆMATODUS*. Perhaps a distinct species,—the *TR. FORSTENI*, Bonap. ? The next is certainly distinct.

*TR. IMMARGINATUS*, nobis, *n. s.* Smaller than *HÆMATODUS*, the feet conspicuously so. Length of wing 5 in., and of tail 4 in. Crimson of the breast and beneath the wing much brighter than in *TR. HÆMATODUS*, and little or no trace of dark terminal margins: nape-feathers with fuscous tips, below which a few feathers are red at base, but shewing less than in *HÆMATODUS*; great abdominal

aviaries. *Habitat* unknown.\* It appears to constitute a second species of the genus *DIARDIGALLUS* of the late Prince of Canino; but still is closely akin to *GALLOPHASIS*, Hodgson, and *NYCTHEMERUS*, Swainson.

*D. FASCIOLATUS*, nobis, *n. s.* Size of a Jungle-fowl; and the tail well arched, as in typical *GALLUS*: papillose crimson skin of the cheeks greatly developed, as in the common Silver Pheasant (*GALLOPHASIS NYCTHEMERUS*), rising on either side into a distinct lappet over the forehead, but not uniting medially to form a comb; also continued downward into well marked incipient wattles, and backward into a peak above the ears. From the crown of the head a most elegant Peafowl-like crest, composed of feathers 3 in. long, the slender black stems of which are quite bare for 2 in., and then each divides and subdivides in a remarkable manner, together forming an acute triangular barbed tip, truncate at the extremity, and of a steel-blue colour. Crown black, passing downward into minutely vermiculated feathers on the neck, fore-part of the back, and breast; the vermiculation less distinct upon the last, which appears of a somewhat dark blended ash-colour: belly, flanks, and tibial plumes, black, the feathers of the flanks tipped with steel-blue: scapularies and wings like the back, but more coarsely vermiculated, each feather terminating in a transverse black band, with narrow whitish margin above, broadest on the scapularies: the great alars, tertiaries, and largest range of wing-coverts, are not thus tipped, but are vermiculated like the inter-scapularies: across the back, above the rump, a shining coppery-golden band; and the rump and upper tail-coverts black, tipped with shining steel-blue, and finally with very rich shining maroon-red: legs bright vermilion, the shank well spurred; and the bill dull waxy-greenish. Irides reddish-hazel. Length of tarse  $3\frac{1}{4}$  in.; of bill to gape  $1\frac{1}{4}$  in., and anterior to nostril  $\frac{3}{4}$  in.: closed wing 9 in., or somewhat less. Female unknown. The figure of the living bird is particularly graceful and *game*-looking; and the bright carmine legs are a conspicuous feature, also the handsome crest, and great development of the papillose naked skin of the cheeks, continued downward into wattles, which are more distinct than in the *NYCTHEMERUS*.

patch dusky-purple: blue of the forehead and cheeks less developed than in the other.

These various Lorikeets are not uncommonly brought alive to Calcutta; but much less numerously than *TE. ORNATUS*, the range of which extends eastward to Celebes,—certainly, however, not to Sumatra, as stated by Raffles.

\* Since writing the above, I have seen another in the possession of a gentleman, who has reason to believe that it is from Borneo.—All are now dead.



4. A small collection from Major Berdmore, sent by him from the Sitang valley, Pegu. It consists chiefly of species previously forwarded by that officer; though several of them are still highly acceptable. Of mammalia, RHINOLOPHUS AFFINIS, Horsfield,—SOREX FULIGINOSUS, nobis (*J. A. S.* XXIV, 362), and SCIUROPTERA SAGITTA *apud nos* (*J. A. S.* XXIII, 731). Of birds, a fine pair of BUCEROS CAVATUS. Of reptiles and fishes, a few known species, including a small MASTACEMBALUS 4 in. in length, which seems to be M. UNICOLOR, K. and V. II., but with 37 dorsal spines (instead of 34), and a row of black spots along the soft dorsal and more obscurely along the anal.\* Also a few crustacea and some good insects.†

We have another MASTACEMBALUS from Maulmein, which seems to be undescribed, and may therefore be designated—

M. ZEBRINUS, nobis. Tail detached from the dorsal and anal fins, as in the common M. PANCALUS of Bengal. Series of 28 or 29 dorsal spines. Colour pale brown, deeper along the back; and marked throughout (more distinctly in the young) with dusky transverse stripes, alternating with fainter stripes more or less regular, which latter are often double or more or less divided, and are set off by the narrow pale interspaces,—much as in the ‘Dauw’ or *original Zebra* (EQUUS BURCHELLII). In the larger specimens the stripes are more or less obsolete, except towards the tail. Dorsal and caudal fins minutely striated; the anal with broad stripes, as on the sides. Our largest specimen, apparently full grown from its bulk, is  $8\frac{1}{2}$  in. in length.

We have also a small *Siluroid* fish from the same locality, which appears to be new both as regards genus and species.

AMBLYCEPS, nobis, *n. g.* Affined to OLYRA,‡ McClelland, but the head much broader and flatter, with minute eyes, placed near the hind aperture of the nostrils: two pairs of cirri above and below, the inner above situate between the fore and hind apertures of the nostrils: pectoral and dorsal spines short and concealed, but comparatively robust: the second or adipose dorsal short and low; and the ventrals and anal also short: tail large and moderately fureate: a band of eard-like teeth above and

\* The EMYS formerly sent by Major Berdmore, and referred to E. OCELLATA, Dumeril and Bibron (*J. A. S.* XXII, 645), proves to be totally distinct from the latter, of which I have lately obtained two living specimens in the Calcutta bazar. The Burmese Terrapin may therefore now bear the name E. BERDMOREI, nobis.

† Another,  $9\frac{1}{2}$  in. long, since received, has 36 dorsal spines, including the comparatively large one immediately anterior to the soft-rayed dorsal.

‡ This name is pre-occupied in Botany.

below, but no palatal band discernible in the specimen: body subcylindrical, compressed, becoming more so to the tail.

AMB. CÆCUTIENS, nobis, n. s. Head broader than the body, flat, obtuse at the muzzle; the mouth moderate, its cleft scarcely continued back laterally: cirri large; the upper labial cirrus reaching to tip of pectoral fin, and the exterior lower one nearly as long. Body long and COBITIS-like. The number of fin-rays is difficult to determine, but seems to be

D. 1-6.—P. 1-2 or 3.—V. 6.—A. 6.

Colour dark brown above, paler beneath. Length of specimen 3 in. To describe this little mud-fish properly, a series of specimens are required, or the sacrifice of our only individual. It will, however, be readily identifiable from the above notice. The individual described was procured by Mr. W. Theobald, Junr., at Maulmein; and others, but in much injured condition, have since been received from Pegu, from Major Berdmore.

Although I have attended pretty regularly the Calcutta fish-bazars during the last year, and have procured many good specimens, and added largely to our collection of fish-skeletons, the only species new to the museum which have been obtained are SERRANUS LANCEOLATUS, C. and V. (small), GERRES POETÆ, C. and V., and OTOLITHUS MACULATUS, C. and V. (four individuals).\* I have procured, however, a fine series of a somewhat rare fish which is perhaps the CHRYSOPHRYS LONGISPINIS, C. and V., apud Bleeker, from Calcutta; but the dentition of which differs altogether from that of CHRYSOPHRYS, there being no palatal teeth, but only a band of "card-like" teeth in each jaw, with reverted tips, especially those in the upper jaw in front, which are much curved backwards. Now the teeth of CHR. LONGISPINIS are described in the *Hist. des Poissons* to be "small, and disposed in three ranges." Our species otherwise approximates the CHR. CALAMARA (Russell, pl. 92), but is less deep in the body, the eye is larger and is situate higher in the head, which last is throughout covered with small indistinct scales. Pre-operculum minutely toothed; mouth slightly protrusile. The dorsal spines are alternately stouter and more slender, as in Rüppell's figure of CHRYSOPHRYS SARBA, and also in DATNIA and DATNIOIDES, Bleeker (founded on the *Coius polota* of Buchanan Hamilton).†

\* Add MESOPRION RANGUS, C. and V.; July 2nd: and since GERRES FILAMENTOSUS.

† Is not this, however, an ANOPLUS of Temminck and Schlegel? Vide *Fauna Japonica*, which I have not seen.



D. 12-14.—A. 3-8.—P. 18.—V. 1-5.—C. 1-16.

The first dorsal spine is short, about half the length of the second, which is two-fifths that of the third, which nearly equals the fourth and longest: thence the spinous portion of the fin slopes gradually backward; and the soft portion is as high as the seventh spine and nearly even. The first anal spine is short, the second long and robust and much flattened, and the third one-sixth shorter than the second and much less robust. Ventral spine longer and more slender than the third anal. Pectorals pointed, their tips reaching to the vent. Ventrals also pointed, terminating in a slight filament. Tail scarcely furcate. Scales of the body somewhat large, especially below the lateral line; numbering about 20 in oblique series descending from the first dorsal spine: those composing the lateral line are about 50 in number.

Colour bright silvery, with a pink iridescence along the back and above the eyes; the membrane of the dorsal fin spotted with dusky, becoming nearly or quite obsolete in large individuals. Rest of the fins white, the tail slightly suffused with dusky towards its tip. Irides white with brilliant nacreous lustre. Our largest specimen measures  $17\frac{1}{2}$  in. in length, with longest dorsal spine  $2\frac{3}{4}$  in. In small specimens (3 in. long), about 9 or 10 transverse bands are faintly discernible on the body, traces of which appear in larger individuals, broken up into spots more or less obscure. As seen on a fish-stall, the brilliancy of the silvery hue of this species attracts attention even from a distance, considerably surpassing that of the common *DATNIA ARGENTEA*, and equalling that of the rarer *GERRES POETE*. Should both genus and species prove new, as I suspect, this fish may be named *POLOTUS NITIDUS*, nobis.

The *Siluroid* fishes have engaged my particular attention; but the following species only have been procured in the bazar.

WALLAGO RUSSELLI, Bleeker: *Silurus boalis*, B. H.; *S. wallagoo*, Val., &c. Extremely common: attaining to an immense size.

W. PABDA; *Silurus pabda*, B. H.: *S. microcephalus*, Val. *Pabda* of Bengális, and certainly the true *pabda* of Buchanan Hamilton. Common: attaining to 9 or 10 in. long, at most.\*

SCHILBE GARUA; *Silurus garua*, B. H. Common: attaining to 14 in. in length.

AILIA COILA; *Malapterurus coila*, B. H.: *Malapterus (Ailia) bengalensis*, Gray; *Ailia bengalensis*, Val., &c. Common.

BAGRUS AOR; *Pimelodus aor*, B. H. Tolerably common.

B. AORELLUS, nobis, n. s. Hitherto confounded with the preceding, but a

\* *W. ANASTOMUS*, (Val.), is also enumerated from Calcutta by Dr. Bleeker.

much thicker fish in proportion to its length; the dorsal spine smaller, and uniformly granulose anteriorly,—instead of shewing a narrow white ridge, set off laterally with black, as in the AOR; the adipose dorsal fin less elongated, but higher, with the same black spot posteriorly; occipital bony process more developed, and posterior to this a small bony plate, not exceeding the occipital process in breadth (whereas the corresponding oval plate in B. AOR is fully twice as broad); at base of the first short dorsal spine, a bone formed of two lateral triangles well united in the middle,—whereas in B. AOR the union of the two lateral triangular bones is generally imperfect, and they are mostly quite distinct; occasionally, even in small specimens of B. AORELLUS, these bones are ankylosed to the oval bone in front of them,—but never in B. AOR. The palatal teeth in B. AOR are arranged in a subeven crescentic band; whereas in B. AORELLUS they are in two lateral sub-triangular masses united in the middle. Ten distinct soft rays to the pectorals and fourteen rays to the ventrals. Colouring much the same; but in B. AORELLUS there is a considerable admixture of black on the pectorals, ventrals, and membrane of the dorsal fin, which does not occur in the other. The two species are about equally common in the Calcutta bazar.\*

B. CAVASIUS; *P. cavasius*, B. H. Common: rarely exceeding 7 in. long.†

B. TENGARA; *P. tengara*, B. H. Common.

B. GULIO; *P. gulio*, B. H.: *B. albilabris*, Val.‡ The *Nuna Tenggara* of the Bengalis, corrupted into *Nonatora* in the *Histoire des Poissons*. Extremely common: attaining to about 10 in. long.

\* Another, closely akin, exists in the B. SINGHALA (*Platystoma singhala*, Sykes); and a fourth in the B. AORINUS of Jacquemont. The latter is not represented to have the conspicuous black spot on the adipose dorsal seen in the others; but neither is it represented in Jacquemont's figure of B. AOR! Buchanan Hamilton's figure of B. AOR represents a young specimen, but still the dorsal spine is not represented of sufficient magnitude. There is also a *B. aorides*, Jerdon, *Madr. Journ.* XV, 336, with maxillary cirri reaching to the tail. In B. AORELLUS they reach to the middle of second dorsal. B. AOR, B. AORELLUS, and OSTEOGENIOSUS CANTORI, are frequently attacked by an ÆGA, which buries its head in the adipose flesh anterior to the second dorsal and the caudal fins.

† The nearly allied *B. keletius*, Val., is enumerated from Calcutta by Dr. Bleeker.

‡ Dr. Bleeker adds, as synonymes, *B. abbreviatus* and *P. fuscus* of the *Histoire*

B. MENODA; *P. menoda*, B. H.: *B. carsio*, Cuv. R. A. (nec *P. carcio*, B. H.); *B. corsula*, Val.; by mistake marked *Mugil corsula* in pl. 1 of Buchanan Hamilton's 'Fishes of the Ganges'; but the original drawing (or a copy of it) marked *P. menoda* in B. Hamilton's hand-writing. Tolerably common: attaining to 14 in. long. A very mucous fish; and those brought to the bazar are commonly much clotted over with an adhesive clayey mud, as if they had burrowed into it; and they are mostly brought many together, appearing as if dug out from the mud of ponds or *jhils* more or less dried up.

B. URUA; *P. urua*, B. H.: *B. exodon*, Val. Identified from a drawing by Buchanan Hamilton. Common; but not often brought to the bazar.

ARIUS GAGORA apud Bleeker; *P. gagora*, B. H. (in part). Excessively common; but I have not been able to obtain it over 17 in. long, whereas B. Hamilton's *gagora* is described to attain to about 3 ft.: he having evidently confounded this and the next species. The present is indeed the commonest of the whole tribe in the Calcutta fish-bazars, and *Bagrus gudio* is the next in abundance: both of these may daily be obtained of all sizes; but I have rarely met with any but adults of A. GAGORIDES and A. ARIOIDES, and only adults of BAGRUS MENODA, which when brought are generally in quantity. The spines of A. GAGORA are less strongly pectinated in front than in B. Hamilton's figure of the species; and there is the usual prolongation of the dorsal beyond its spine. Dorsal and pectoral spines moderate, comparatively slender, and granulated in front only, the sides being striated. The upper labial cirri reach back to base of pectoral spines. Mouth comparatively small, its cleft scarcely reaching back one-third to below the eye. *Palatal teeth mammilliform, and totally unlike the maxillary teeth*; whereas in the next two species, the palatal and maxillary teeth are similar. No blackish tinge on the ventral and anal fins; nor trace of aureous wash on the upper-parts. A specimen 10 in. long has the dorsal spine 1½ in.; and one of 15 in. has the dorsal spine 2 in.

A. GAGORIDES; *Bagrus gagorides* and *B. trachypomus*, Val.: *P. gagora*, B. H. (in part). Nearly allied to A. ARIOIDES; but the interparietal plate differs in shape, and the upper cirri reach only to base of pectorals, as in A. GAGORA. Upper lip, as seen from beneath, protruding in the middle, so as to be there twice as broad as at the sides. Dorsal and pectoral spines much stouter than in A. GAGORA, and granulated half-way on the sides towards the front. General hue dull lurid purple with a

*des Poissons*,—and *B. gudioides*, *B. melas*, *B. Schlegelii*, and *B. rhodopterygius*, Bleeker.

golden shine; the head browner: fins purple; no dark spot on the adipose dorsal; and the lower-parts subdued white, studded over with minute dusky specks (which also occur in *A. ARIOIDES*, but to a less extent). This species is rarely procurable of small size, and it commonly occurs 2½ ft. or more. In a specimen 5¼ in. long, the dorsal spine measures 1¼<sup>3</sup>/<sub>8</sub> in.; in one of 10 in., 1<sup>7</sup>/<sub>8</sub> in.; of 15 in., 2½ in.; of 2 ft., 4 in.; of 2½ ft., 4<sup>3</sup>/<sub>4</sub> in.; and of 2¾ ft., 5 in.: the membrane of the dorsal is scarcely prolonged beyond its spine, to a much less extent than in the two other species. Occasionally, though rarely, one or more of the cirri are divided in this fish, as usual in several of the Nilotic SILURIDÆ. It is not uncommon.

*A. ARIOIDES*; *Bagrus arioides*, Val.; *Pimelodus auratus*, B. H. (MS. on coloured drawing, nec *B. AURATUS*, Val.). Tolerably common, or rather now and then brought in quantity: attaining to about 12 or 13 in. long. Upper cirri reaching back to base of dorsal spine. The dorsal and pectoral spines proportionally larger than in *A. GAGORIDES*, also more strongly pectinated behind, and more extensively granulated on the sides; the membrane of first dorsal prolonged beyond the spine, as usual as in the present group. All the fins are suffused with black, more or less. A distinct aureous wash on the upper parts, which begins to make its appearance when the fish is about 6 in. long; prior to which the general hue is plain plumbeous or livid, with the fins conspicuously almost wholly purple-black. Eyes proportionally large. Mouth (as in *A. GAGORIDES*) broader than in *A. GAGORA*; its cleft reaching half-way to below the eye, as seen in profile. A specimen 12 in. long has the dorsal spine 2<sup>3</sup>/<sub>8</sub> in., and one exceeding 13 in. has it 2<sup>3</sup>/<sub>4</sub> in.

*RITA BUCHANANI*, Bleeker: *Pimelodus rita*, B. H.; *Arius rita* et *A. ritoides*, Val. Common, chiefly in the hot season.

*OSTEOGENEIOSUS CANTORI*, Bleeker: *Arius militaris* of Gangetic rivers, *auctorum*. Somewhat rarely brought.

*PANGASIUS BUCHANANI*, Val.: *Pimelodus pangasius*, B. H. Very common.

*SILUNDIA GANGETICA*, Val.: *Pimelodus silundia*, B. H. Very common.

*BAGARIUS BUCHANANI*, Bleeker: *Pimelodus bagarius*, B. H. Not rare. Attains an enormous size, but large specimens are seldom brought to the bazar.

*PIMELODUS GAGATA*, B. H. Not rare during the rains.

*CLARIAS MAGAR*; *Macropteronotus magur*, B. H. Very common.

*SACCOBRANCHUS FOSSILIS*; *Silurus fossilis*, Bloch: *S. singio*, B. H. Extremely common.

*PLOTOSIUS CANIUS*, B. H. Very common.

Of ESOCIDÆ, Buchanan Hamilton notices only three species, all of which are assigned by him to the old genus *ESOX*. These are—*BELONE CANCELATA*, (B. H.), *HEMIRHAMPHUS ECTUNTIO*, (B. H.—*ANGULATUS*, *ibid.*, on unpublished drawing), and *PANCHAX BUCHANANI*, Val. Two species of *BELONE* and three of *HEMIRHAMPHUS*, however, are about equally common in the Calcutta provision-bazars; and another species of each genus occurs at the Sandheads, at the mouth of the Hughli. A second *PANCHAX* also is sometimes brought in great numbers to the fish-bazars.

*BELONE TENUIROSTRIS*, nobis, *n. s.* As compared with *B. CAUDIMACULA*, Cuv., the general form is more slender, elongated, and compressed; with jaws of equal length (minus the cartilaginous tip of the lower), narrow and considerably more tapering in width to the extremity. Head a third of the entire length. Eyes moderately large, occupying about three-fifths of the vertical diameter of the head. Series of longer teeth slender and uniform in both jaws, becoming gradually smaller towards their tips; the minute intermediate teeth being so small as to be barely perceptible. Cheeks distinctly scaled. Low hind portion of the dorsal and anal fins much developed: the other fins of the usual proportions.

D. 19.—A. 24.—P. 11.—V. 6.—C. 15 (exclusive of the short exterior rays).

Colour greenish above, silvery below, with a very brilliant silvery stripe along each side, broadening posteriorly; the lower portion of the operculum also brilliant silvery, and likewise the sides of the lower jaw. Fins yellow more or less, with some black at the tips of the pectorals, and middle of the fork of the caudal—no spot at base of caudal, as in *B. CAUDIMACULA*.—From the Sandheads.

Our other species are—

*B. CAUDIMACULA*, Cuv.; Russell, pl. 176. Found also in the China seas.

*B. CANCELATA*; *Esox cancelata*, B. Hamilton.

The *B. ANNULATA*, C. V., keeps further out to sea, but is common on the coast of Orissa.

Of *HEMIRHAMPHUS*, the next three species are brought commonly to the Calcutta bazars.

*H. ECTUNTIO*; *Esox ectuntio*, B. H. With upper jaw about a third as long as the lower, flat, and tapering from about the middle to an obtuse point. Eyes but half the vertical diameter of the head. Tail rounded, Ventral fins small, placed near the anal, and reaching close to the anus. In a specimen  $6\frac{3}{4}$  in. long, the lower jaw exceeds the upper by 1 in., and the upper from cleft of mouth measures  $\frac{1}{2}$  in. According to Buchanan Hamilton, this fish “does not exceed a foot in length.” I have not obtained it so large as 7 in. He states, also, that “each side has a broad



longitudinal stripe, shining like silver." The sides are indeed silvery, but ill-defined, except where forming a narrow streak towards the tail.

D. 13.—A. 11.—P. 7.—V. 5.—C. 14.

This species seems to be affined to *H. REYNALDI* of Valenciennes.

*H. BRACHYNOTOPTERUS*, Bleeker: *Esox angulatus*, B. H. (MS. on drawing). Upper jaw very short, triangular, broader than long, almost flat but with distinct angulate ridge. Eyes three-fifths of the vertical diameter of the head. Tail furcate. Ventrals placed midway on the body, far anterior to the anus. In a specimen 7 in. long, the lower jaw exceeds the upper by  $1\frac{1}{8}$  in., and the upper jaw from cleft of mouth measures  $\frac{3}{16}$  in. I have not seen it larger. A narrowish well defined silvery stripe extends from the base of the pectorals to the middle of the caudal. The dorsal fin contains 11 to 13 rays in perfect specimens.

D. 11 to 13.—A. 15.—P. 7.—V. 6.—C. 14.

*H. STRIGA*, nobis, *n. s.* With upper jaw subtriangular, rounded in front, a little longer than broad, flat, with very indistinct trace of angulate ridge; the lower jaw much longer than in the two preceding species. Eyes three-fifths of the vertical diameter of the head. Tail rounded. Ventrals small, placed near but not reaching to the anus. In a specimen  $8\frac{1}{2}$  in. long, the lower jaw exceeds the upper by  $2\frac{1}{3}$  in., and the upper jaw from cleft of mouth measures  $\frac{1}{4}$  in. Lateral silvery stripe narrow and little perceptible, excepting towards the tail, where broader and distinct. A medial dusky line along both mandibles and middle of the fore-part of the back. Operculum brilliant silvery.

D. 12 or 13.—A. 8 or 9.—P. 9 or 10.—V. 6.—C. 14.

*H. PLUMATUS*, nobis, *n. s.* General aspect of preceding species, but the eye less than half of the diameter of the head: the lateral scales of the body also much larger; and the upper jaw tapering to an obtuse point, and distinctly angulated. Each nostril covered by a remarkable plume of filaments. Tail furcate. Ventrals placed near the anus, but not reaching to it. In a specimen 11 in. long, the lower jaw exceeds the upper by  $2\frac{1}{2}$  in., and the upper from cleft of mouth measures  $\frac{1}{2}$  in. A well defined silvery stripe from base of pectorals, becoming rather broad towards the tail.

D. 15.—A. 13.—P. 9.—V. 6.—C. 15.

From the Sandheads, and also the coast of Ceylon.

Our species of *PANCHAX* are—

*P. BUCHANANI*, Valenciennes; *Esox panchax*, B. H. To the numerous synonymes of this species collated by Dr. Bleeker, add *Aplocheilus rubrostigma*, Jerdon, *Madr. Journ.* XV., 331.

*P. CYANOPHTHALMA*, nobis, *n. s.* Smaller than *P. BUCHANANI*, not



exceeding  $1\frac{1}{4}$  in. long, with fins less elevated and tail much less pointed; the eyes also less distantly apart, and of a brilliant pale naereous azure (those of the other being yellow). Colour whitish, diaphanous, studded with dark specks which are less numerous below the lateral line: scales large, barely discernible.

D. 7.—A. 22 or 23.—V. 3.—P. 5?—C. 14.

This minute fish is sometimes brought to the bazar in considerable quantities, many pounds' weight of them together. Occasionally, a few of the P. BUCHANANI may be picked out of the mass, and some fry of other fishes, especially MUGIL CORSULA; but the present species, remarkable for its conspicuous light blue irides, predominates in the rate of 50 or more to 1 of any other. Wherever it occurs, therefore, it would seem to abound excessively.

The following CYPRINIDÆ may likewise be here described.

SYSTEMUS MICROLEPIS, nobis, n. s. Much resembling S. OGILBII (*Rohtee Ogilbii*, Sykes);\* but with still smaller scales, and the dorsal spine is more finely pectinated behind. Scales larger on the anterior two-fifths of the body; and a series of 44 of them, counting obliquely downward, and of 73 along the lateral line.

D. 3-7.—A. 1-18.—P. 13.—V. 7.—C. 19.

Spinous ray of anal-fin minute: the pectorals not reaching to base of ventrals: tail furcate. Colour (*blanched* in spirit) silvery throughout. Length of specimen, to end of tail-lobes,  $6\frac{1}{2}$  in.; and depth at base of dorsal fin.  $2\frac{3}{8}$  in. Form very Bream-like.

Hab. ————— ?

LEUCISCUS SALMOIDES, nobis, n. s. Affined to *L. goha* (*Cyprinus—Barilius goha*, B. II., v. *Opsarius gracilis*, McClelland); but larger and deeper in the body, with the spots smaller, much more numerous, and more regularly disposed, many of them occurring below the lateral line, and others on the opercula and præ-opercula: upper lip studded with pores.

D. 10.—A. 13.—P. 14.—V. 9.—C. 18.

Lateral line composed of 88 to 90 scales; and oblique series of 26 scales descending from anterior base of dorsal. Length of specimen 11 in. Colour blanched in spirit. Procured at Alláhábád by the late Major Wroughton.

L. LINEOLATUS, nobis, n. s. A PERILAMPUS of McClelland, affined in

\* Dr. Jerdon refers the species of *Rohtee*, Sykes, to ABRAMIS; but they clearly appertain to SYSTEMUS, as assigned by Dr. Bleeker: *vide* dorsal spines, &c.

form to *L. DANICONIUS* (*Cyprinus daniconius*, B. H.), but the lateral line placed very low, as in *DANGILA*; and readily distinguished by its peculiar markings. A dusky spot behind the gill-covers, placed in a whitish space; beyond which a broad darkish band extends to the middle of the tail, bordered by a narrow pale line above and below, the lower not reaching so far forward as the upper: below this again another dark band, and then white; and above a second and trace of a third pale line.

D. 12.—A. 14.—P. 11.—V. 8.—C. 18?

Series of 10 oblique scales, the lateral line on the 9<sup>th</sup> of them, and numbering about 32 scales. Length of specimen  $3\frac{1}{4}$  in. Procured at Darjiling by Major Sherwill.

*L. BINOTATUS*, nobis, *n. s.* Affined to *L. CASUATIS*, (B. H., v. *Systomus malacopterus*, McCl.), but less deep in the body, and the dorsal fin much smaller; with a conspicuous black spot on the middle of base of tail, and another at hind base of dorsal: the rest green, with silvery lateral streak and below, and traces of a dark band along the lateral line; which last is medial and is composed of about 25 scales: oblique series of scales 7; the line passing along the fourth of them from above. Eyes rather large, and silvery.

D. 9.—A. 6.—

Length of specimen  $1\frac{1}{2}$  in. From Ceylon. Dr. E. F. Kelaart.\*

\* The *SYSTOMUS TRIPUNCTATUS*, Jerdon, is perhaps a *LEUCISCUS* akin to the above.

From Messrs. T. H. Hamilton & Co. The nest of a common Crow (*CORVUS SPLENDENS*), constructed in great part of the wires used in fastening down the corks of soda-water bottles. Two Crows' nests thus composed are noticed in the 'Calcutta Review,' Vol. XXVIII. p. 137; where it is observed that—"As it may well be wondered where such an accumulation of these could be procured, we may remark that Bengali servants are in the habit of treasuring them up till they amount to a saleable quantity; and that enormous heaps of them may accordingly be seen in the shops of those not very respectable small dealers, whose proper avocation is, with similar shops in England, indirectly purported by the announcement.—'Dealer in Marine Stores.' The supply of materials, therefore is comprehensible, however curious its application.—E. B.

NOTE ON THE HOGS OF THE NICOBAR ISLANDS (*vide* p. 268.)

In some "Sketches at the Nicobars," published in the *Journal of the Indian Archipelago*, Vol. III, we read (p. 265) of preparations made for a feast. "Enormous Pigs strung by their legs to long poles, were carried, some by four others by six athletic men. These Pigs were truly most gigantic animals." This was in the island of Car Nicobar; and the Pigs in question were doubtless originally derived from the shipping. We have met with another notice referring to the large size of the Pigs in the Nicobar Islands.—E. B.

## FOR JULY, 1858.

The Monthly General Meeting for July was held on the 6th instant.

Sir James Colville, Knt., President, in the Chair.

The proceedings of the May meeting were read and confirmed. No meeting was held in June on account of the repairs.

Presentations were received—

1. From the Royal Prussian Academy of Sciences at Berlin, the latest publications of the Academy.

2. From the Ceylon Branch of the Royal Asiatic Society, the latest journals of the Society.

Mr. B. H. Hodgson and Dr. Falconer, duly proposed in March last were balloted for and elected Honorary Members of the Society.

Mr. Sutherland duly proposed and seconded in May last, was balloted for and declared elected.

Communications were received—

1. From Baboo Radanauth Sikdar, an abstract of the Meteorological Observations taken at the Surveyor General's Office during the month of February last.

2. From the Venerable Archdeacon Pratt, M. A., a paper on the great Indian Arc of Meridian and the Figure of the Earth.

Mr. W. T. Blanford gave an account of the observations which had been made in Orissa by a party of the Geological Survey during the past season's field work, and exhibited to the Society the map of that province coloured geologically. The results of the examination were, that Orissa is mainly formed by the combined Delta of the rivers Mahanuddee and Brahmini, the deposits formed by which at their mouth have caused the land to gain upon the sea, and thus produced a considerable projection from the general run of the coast. A similar effect is seen at the mouth of the Godavery. While the Eastern portion of the province is formed of an extensive level plain, the western part is dotted over with detached hills, and near Bala-sore bounded by the fine range known as the Nilgiri hills. All of these peaks and ranges are composed of gneiss, except in the case of

a cluster of low ranges South and West of the town of Cuttack. These are composed of sandstone which has been referred to the same age as the rocks of the Mahadewa hills in Central India, but the connexion is not clearly established.

Laterite occurs largely in Orissa forming terraces like plains around all the hills up to a certain level, which level diminishes in height towards the East until at length the laterite is covered up by the alluvium of the low country. From various considerations it appears probable that there are, in Orissa, two kinds of laterite, one formed by detrital action and containing sand, rounded pebbles and boulders, the other resulting from the alteration in situ of gneiss or sandstone. The former appears to be invariably present where any laterite occurs. The quantity of iron contained appears difficult to account for.

Besides the flat Delta alluvium of Southern and Central Orissa, a considerable area in Northern Orissa is covered by an alluvium of older date which generally contains a gravelly form of laterite. Wherever the coast faces to the South-East sand hills occur, generally in several successive ranges one behind the other, each marking an old coast line.

In conclusion the uses to which many of the rocks of Orissa are put for building and other purposes were pointed out and the availability of some of them remarked on.

In a discussion which ensued Captain Sherwill explained the mode of occurrence of laterite in the Rajmahal Hills.

Captain Young gave some details relating to the same rock near Rangoon.

Professor Oldham described some curious phenomena connected with the occurrence of laterite in Ceylon and elsewhere, at the same time shewing that the name laterite had been applied without good reason to a number of different rocks distinct from that for which it was originally proposed.

Professor Oldham also mentioned that he had just been informed by a member, that a belief existed to the effect that formerly the bay between the mouths of the Brahmini and Soobunreeka was cultivated land, the sea being kept out by a bund which has since been destroyed. This rumour seems opposed by the present Geological

configuration of the coast, but it would be interesting to ascertain what foundation it has.

The Librarian submitted his usual monthly reports for May and June, 1858.

#### LIBRARY.

The following additions were made to the library during May and June, 1858.

#### *Presented.*

Abhandlungen der kon. Akademie der Wissenschaften, zu Berlin, for 1856, Royal 4to.—BY THE PRUSSIAN ROYAL ACADEMY OF SCIENCES.

Archæologia: or, Miscellaneous Tracts relating to Antiquity, *London*, Vols. 36 and 37, 4to.—BY THE SOCIETY OF ANTIQUARIES: LONDON.

Biblioteca Arabo-Sicula ossia Raccolta di Testi Arabici che Toccano La Geografia, la Storia, le Biografie, e la Bibliografia della Sicilia, Fasc. I. to III. *Lipsia*, 1855 and 1856.—BY THE GERMAN ORIENTAL SOCIETY OF LIEPZIG.

Calcutta Christian Observer for May and June, 1858.—BY THE EDITOR.

Correspondence relating to the establishment of an Oriental College in London, *pamphlet*, 1858.—BY THE WRITER.

Half yearly Paper of the Chamber of Commerce.—BY THE CHAMBER.

Journal Asiatique, Nos. 41 and 42.—BY THE ASIATIC SOCIETY OF PARIS.

——— of the Agricultural and Horticultural Society of India, Vol. X. Part. I., *Calcutta*, 1858, 8vo.—BY THE SOCIETY.

——— of the Ceylon Branch of the Royal Asiatic Society, Vol. II. Nos. 1 to 3, and Part I. of 1856-58.—BY THE SOCIETY.

——— (Madras) of Literature and Science, Vol. III. No. 5, for October and December, 1857.—BY THE MADRAS ASIATIC SOCIETY.

Memoire della Reale Accademia della Scienze di Torino, Serie seconde, Tome XVI. *Torino*, 1857, 4to.—BY THE ACADEMY.

Monatsbericht der kon. Preuss. Akademie der Wissenschaften zu Berlin, from January to December, 1857.—BY THE ACADEMY.

Macgowan's (Dr.) Remarks on Chinese Foreign Relations, *pamphlet*, 1857.—BY THE AUTHOR.

Meteorological Observations made at Dodabetta, 1851-55, 4to. Madras.—THROUGH THE GOVT. OF INDIA (HOME DEPT.)

Oriental Baptist for May and June, 1858.—BY THE EDITOR.

——— Christian Spectator from March to May, 1858.—BY THE EDITORS.

Proceedings of the Royal Society, Vol. VIII. No. 27 and Vol. IX. Nos. 28, 29 and 30.—BY THE SOCIETY.

———— of the Royal Society of Edinburgh, Vol. III. No. 47.—BY THE SOCIETY.

———— of the Society of Antiquaries of London, Vols. III. and IV. Nos. 43 to 46.—BY THE SOCIETY.

Title-page of Vol. III. and List of Members of the Society.—BY THE SAME.

Quarterly Journal of the Geological Society of London, Nos. 53 and 54.—BY THE SOCIETY.

Recueil des Actes De l'Académie Imperiale des Sciences, Belles lettres, et Arts de Bourdeaux, 1 et 2 Trimestres, 19th Année, 1857.—BY THE ACADEMY.

Report of the Calcutta Mechanics' Institution and a few other pamphlets.—BY BABU RAJENDRALAL MITTRA.

Transactions of the Philological Society, London, for 1854, 1855 and 1856, 8vo.—BY THE SOCIETY.

———— of the Royal Society of Edinburgh, Vol. XXI. Part IV. 4to.—BY THE SOCIETY.

Tattwabodhini Patrica, Nos. 177 and 178.—BY THE EDITOR.

Weber's (Dr. A.) Indische Studien, Band IV. Heft. I. and II.—BY THE AUTHOR.

Weber's White Yajurveda, Part III. No. 12.—BY THE AUTHOR.

Werken van het Koninklijk Instituut voor Taal,—Land—en Volkenkunde van Nederlandsch,—Indie, Riezen en onderzoekingen in den Indischen Archipel door, D. S. Müller, Deel I. and II. 8vo.—BY THE ROYAL INSTITUTION OF NETHERLANDS.

Ditto, ditto Het Boek Adji-Sáká, *Amsterdam*.—BY THE SAME.

Vividhartha Sangraha, Nos. 47 and 48.—BY BABU RAJENDRALAL MITTRA.

Zietschrift der deutschen morgenlandischen Gesellschaft, Band XII. Heft 1, *Liepzig*.—BY THE GERMAN ORIENTAL SOCIETY.

*Exchanged.*

Athenæum for February, March and April, 1858.

Annalen der Chemie und Pharmacia from December to March, 1858.

Calcutta Review (The) No. 59, March, 1858.

The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science, Nos. 99 to 101, March to May, 1858.



*Purchased.*

- Annals and Magazine of Natural History, Nos. 3 to 5, 1858.  
 American Journal of Science and Arts, No. 74.  
 Annales des Sciences Naturelles, Nos. 5 and 6, Tome VII.  
 Comptes Rendus, Nos. 6 to 18, February 8th to 3rd May, 1858.  
 Edinburgh Review, No. 218 for April, 1858.  
 Journal des Savants for February and March, 1858.  
 Literary Gazette, Nos. 2140 to 2156, and extra Nos. 17 to 19 of 1856.  
 Natural History Review, No. 2. Vol. V. April, 1858.  
 Quarterly Review, No. 206, April, 1858, Vols. 92, 93, 94, 95 and 96.  
 Revue des Deux Mondes, 15th March to 1st May, 1858.  
 ——— de Zoologie, Nos. 1 to 3, 1858.

## BOOKS.

- Andersson's (C. John Mr.) Lake Ngami; or Explorations and Discoveries during four years' Wanderings in the Wilds in South Western Africa. *London*, 1856, 8vo.  
 Atkinson, T. Witlam, Oriental and Western Siberia, and Chinese Tartary.  
 Buffon's Histoire des Insects Lèpidoptères, Tome X. 8vo.  
 Barth's (Henry) Travels and Discoveries in North and Central Africa : being a Journal of an Expedition undertaken under the auspices of H. B. S. Government in the years 1849 and 1855 in 5 Vols. Reed. Vols. 3, 8vo. *London*.  
 Barges' Epistola.  
 Benfey's Indica.  
 Bopp's (Franz) Über den Einfluss der Pronomina auf die Wortbildung im Sanscrit und den mit ihm, verwandten Sprachen, *Berlin*, 1832, pamphlet.  
 Burnouf et Lassen's Observations Grammaticales sur quelques Passages de L'Essai sur le Pali, *Paris*, 1827, pamphlet.  
 Bellot's Sanscrit Derivations.  
 Boehlingk's (Otto) Die Unâdi Affixe, pamphlet, 4to.  
 Boehinger's (J. J.) La Vie Contemplative, Ascétique et Monastique chez les Indous et chez les Peuples Bouddhistes. *Strasbourg*, 1831, 8vo.  
 Brougham's (Lord Henry) Political Philosophy, Vol. I. 8vo.  
 Crawford's (John) Dictionary of the Indian Islands and adjacent countries, *London*, 1856, 8vo.  
 Candolle's (M. Alph. de) Géographie Botanique Raisonnée, Tomes I. and II. *Paris*, 8vo. 1855.  
 Deslongchamps' (A. L.) Amarkocha ou vocabulaire D'Amarasinha publié en Sanskrit avec une Traduction Française, Parts I. and II. *Paris*, 8vo. 1845.

Fournel's (Henri). *Etude sur La Conquête de l'Afrique par les Arabes* Part I. *Paris*, 1857, 4to.

Hardwicke's (C.) *Christ and other Masters: an Historical enquiry into some of the chief parallelisms and contrasts between Christianity and the religious systems of the Ancient World.* Part II. *Religions of India*, *Cambridge*, 1857, 8vo.

Julien's (St.) *Histoire de La vie de Hiouen-thsang et de ses voyages dans L'Inde*, *Paris*, 1853, 8vo.

Koeppen (C. F.) *Die Religion des Buddha und ilire Entstehung*, *Berlin*, 1857, 8vo.

Legnest's (M. L'Abbe) *Etudes sur la formation des Races Sémitiques suivies de considerations générales sur l'origine et la developpement du Langage*, *pamphlet*, *Paris*, 1858.

Malkuma's *Poems*.

Néne (F.) *Essai sur le Mythe des Ribhavas premier vestige de L'Apotheose dans le Véda*. *Paris*, 8vo. 1857.

*Notices et Extracts des Manuscrits de la Bibliothèque du Roi et autres Bibliothèques*, Tome X. to XIV. (Vol. 14 has 2 parts) and Tome XVII. *Parte 2nd*, 4to.

Parie (Théodore) *Tarikh i Asham Récit de l'expédition de Mir Djumlah au pays D'Assam*, *Paris*, 8vo. 1845.

Rnbuer II *Die Riese Seiner Koniglichen Hoheit des Prinzen Waldemar von Prenszen noch Indien in den Dohren*, 1844 bis 1846, *Berlin*, 1857.

Spier's (Mrs.) *Life in Ancient India*, *London*, 8vo.

Spiegel's (Dr. F.) *Anecdota Pâlica*, *pamphlet*, *Liepzig*, 1845.

Thnillier's (H. L.) and Capt. R. Smyth's *Manual of Surveying for India*, 8vo. 1855.

Vuller's (Joannis Augusti) *Lexicon Persico-Latinum*, Fas. V. *Parts I. and II.* 4to. *Bonera*, 1856-57.

Weber's *Indische Studien*, Band IV. P. 2.

*Westminster Review*, No. 26, April, 1858.

Wilson's Leighton (Rev. J.) *Western Africa; its History, Condition and Prospects*, *London*, 8vo. 1856.

Woodward (S. P.) *A Treatise of Recent and Fossil Shells*, 3 Nos.

———— Ditto (new copy) 12mo.

GOURDASS BYSA'CK,

*Librarian and Asstt. Secy.*

*The Asiatic Society's Rooms,*

*8th July, 1858.*

FOR AUGUST, 1858.

The Monthly General Meeting for August was held on the 4th instant.

HON'BLE SIR JAMES COLVILLE, K.T., *President*, in the chair.

The proceedings of the July Meeting were read and confirmed.

Presentations were received—

1. From Capt. Bivar at Debrooghur through Dr. Mouat, some fragments of Hindu sculpture consisting of an image of the Hindu Deity Durga or Dossovooja and a portion of a cornice frieze. Capt. Bivar has promised a communication on the subject, but it has not yet been received.

2. From the Acting Principal of the Government Grant Medical College Bombay, a copy of the Report for the session 1857-58.

3. From the Raja Pertap Chundra Singh Bahadur, a copy of the Ratnavali Natika in Bengali, with an English translation by M. M. S. Dutt, Esq.

A note from Lieut.-Col. Jenkins expressing his wish to withdraw from the Society was recorded.

The Council submitted a report announcing that they had appointed Dr. Crozier, a member of their body, in place of Dr. Boycott, who had left India; and also that they had added Babu Rangopaul Ghose, to the Finance Committee, and Dr. Crozier to the Committee of Natural History.

Communications received—

1. The following note, accompanied by a copper plate, from Mr. Biss, Assistant, Revenue Accountant's Office:—

DEAR SIR,—The accompanying copper plate was unearthed some 20 years ago in Lot No. 55 of the Soonderbunds in digging a tank. In the vicinity of the spot where it was found there are ruins of the abode apparently of some wealthy person.

Whether or not the inscription on the plate is of any interest I cannot say, but as I have reason to suppose it to be of ancient date, I would leave it with you to submit it for the inspection of the Society, or not, as you may deem fit. I can at present only offer it for inspection it being the property of another.

Yours faithfully,

(Sd.) T. W. BISS.

Babu Rajendralal Mitra supplied the following information regarding the plate:—

The plate is an oblong of  $11\frac{1}{2}$  inches by 6 inches with an arched projection at one end with two perforations. It has a Sanskrit inscription of 15 lines on one side and 14 on the other; the characters being the Gour of the same date as the Backergunge plate noticed in the 8th volume of the Asiatic Society's Journal. The plate has been very much injured by exposure to the atmosphere and the inscription is almost illegible. From a few lines in the centre of the obverse it appears that the plate was inscribed (as generally such plates are) to record the grant of a piece of land in the Soonderbuns, bounded on the east by the bank of the Matanga River, on the south by the sea and on the west by *Kukuta pattana*. The date is illegible, but from the occurrence of the name Vaidyaka Sena, and the style of the writing, the gift is supposed to be of the period of the Sena Rajas of Bengal.

2. From Babu Radhanauth Sickedar, being an Abstract of the Meteorological Register kept at the office of the Surveyor General, Calcutta, for March and September last.

Lieut.-Col. Strachey explained to the meeting the application of certain sliding scales to arithmetical computation.

The Librarian submitted his usual monthly report for July last.

#### LIBRARY.

The following additions were made to the Library during July 1858.

#### *Presentations.*

Annals of Indian Administration. The Indian Official Thesaurus, being Introduction. Compiled by M. Townsend.—BY THE HOME GOVERNMENT.

Ditto, Parts III. to VI.—BY THE SAME.

Calcutta Christian Observer for July, 1858.—BY THE EDITORS.

Oriental Baptist, No. 140, for July, 1858.—BY THE EDITOR.

Oriental Christian Spectator for June, 1858.—BY THE SAME.

Report on the Revenue Administration of the Lower Provinces for 1856-57.—BY THE BENGAL GOVERNMENT.

Ditto on Public Instruction in the Madras Presidency for 1856-57.—BY THE HOME GOVERNMENT.

Selections from the Records of the Bombay Government with four Maps, No. XLV. Report on the upper portion of the Eastern Naraca, and the feasibility of restoring it as a permanent stream, accompanied by Maps and Plans.—BY THE BOMBAY GOVERNMENT.

Report of the Konnugor Seminary, Sessions 1857-58.—BY BABU SEEBCHUNDER DEB.

Calcutta Review, No. 60, for June, 1858.—BY THE EDITOR.

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*Erratum*, p. 17, first line, For "C. 1—16," read C. 16.





*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1858.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.822	29.909	29.721	0.188	77.4	89.8	68.8	21.0
2	.807	.880	.741	.139	76.0	85.8	67.8	18.0
3	.841	.915	.775	.140	77.2	85.4	71.6	13.8
4	.871	.952	.822	.130	77.6	87.4	70.0	17.4
5	.876	.963	.812	.151	77.3	87.7	67.0	20.7
6	.858	.937	.806	.131	78.0	88.6	71.6	17.0
7	<i>Sunday.</i>							
8	.883	.965	.838	.127	80.3	89.6	73.8	15.8
9	.877	.959	.809	.150	80.0	89.3	72.3	17.0
10	.868	.941	.816	.125	80.6	88.5	75.3	13.2
11	.883	.961	.819	.142	80.9	90.7	74.4	16.3
12	.879	.975	.791	.184	80.4	91.2	71.6	19.6
13	.857	.944	.788	.156	81.9	93.7	72.6	21.1
14	<i>Sunday.</i>							
15	.857	.934	.799	.135	83.4	95.6	74.7	20.9
16	.841	.927	.764	.163	83.9	95.6	74.3	21.3
17	.823	.893	.757	.136	84.1	95.6	73.8	21.8
18	.851	.913	.792	.131	83.9	97.0	75.4	21.6
19	.908	.980	.814	.136	83.4	93.8	74.1	19.7
20	.943	30.016	.878	.138	82.7	92.6	73.5	19.1
21	<i>Sunday.</i>							
22	.836	29.911	.767	.144	83.4	94.4	74.8	19.6
23	.827	.907	.759	.148	83.6	93.4	77.4	16.0
24	.862	.945	.799	.146	84.1	94.7	74.2	20.5
25	.881	.976	.793	.183	83.4	94.2	75.6	18.6
26	.866	.953	.800	.153	83.3	92.6	76.9	15.7
27	.837	.915	.721	.194	81.9	92.0	75.0	17.0
28	<i>Sunday.</i>							
29	.772	.880	.702	.178	81.2	87.4	76.2	11.2
30	.744	.825	.686	.139	82.8	92.0	76.2	15.8
31	.758	.827	.698	.129	83.2	91.6	77.2	14.4

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the twenty-four hourly observations made, during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1858.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

Date.	Mean Wet Bulb Ther- mometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of air.	Additional Weight of Va- pour required for com- plete saturation.	Mean degree of Humi- dity, complete satura- tion being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	71.0	6.4	67.8	9.6	.677	7.33	2.68	0.73
2	69.2	6.8	65.8	10.2	.634	6.90	.70	.72
3	71.6	5.6	68.8	8.4	.699	7.59	.36	.76
4	68.4	9.2	63.8	13.8	.593	6.42	3.65	.64
5	67.6	9.7	62.7	14.6	.572	.20	.78	.62
6	69.8	8.2	65.7	12.3	.632	.85	.34	.67
7	<i>Sunday.</i>							
8	70.0	10.3	64.8	15.5	.613	.61	4.30	.61
9	72.0	8.0	68.0	12.0	.681	7.35	3.46	.68
10	74.2	6.4	71.0	9.6	.751	8.09	2.92	.74
11	72.0	8.9	67.5	13.4	.670	7.23	3.87	.65
12	69.8	10.6	64.5	15.9	.607	6.54	4.40	.60
13	70.7	11.2	65.1	16.8	.619	.66	.78	.58
14	<i>Sunday.</i>							
15	72.4	11.0	66.9	16.5	.657	7.03	.93	.59
16	74.8	9.1	70.2	13.7	.732	.82	.31	.65
17	74.7	9.4	70.0	14.1	.727	.78	.43	.64
18	74.0	9.9	69.0	14.9	.704	.53	.60	.62
19	72.8	10.6	67.5	15.9	.670	.18	.78	.60
20	70.8	11.9	64.8	17.9	.613	6.58	5.14	.56
21	<i>Sunday.</i>							
22	74.4	9.0	69.9	13.5	.725	7.76	4.20	.65
23	74.9	8.7	70.5	13.1	.739	.92	.11	.66
24	74.6	9.5	69.8	14.3	.722	.73	.48	.63
25	73.7	9.7	68.8	14.6	.699	.48	.48	.63
26	75.0	8.3	70.8	12.5	.746	.99	3.94	.67
27	75.5	6.4	72.3	9.6	.783	8.41	.03	.74
28	<i>Sunday.</i>							
29	75.8	5.4	73.1	8.1	.803	.65	2.56	.77
30	76.4	6.4	73.2	9.6	.806	.64	3.11	.74
31	77.0	6.2	73.9	9.3	.824	.85	.04	.74

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1858.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.857	29.969	29.729	0.240	76.6	80.0	68.0	12.0
1	.846	.955	.722	.233	76.0	79.2	68.2	11.0
2	.833	.935	.718	.217	75.5	78.6	68.5	10.1
3	.821	.927	.709	.218	75.4	78.0	69.4	8.6
4	.821	.935	.702	.233	74.5	77.9	68.2	9.7
5	.832	.942	.710	.232	74.5	77.6	68.0	9.6
6	.853	.965	.753	.212	73.9	77.8	67.0	10.8
7	.878	.989	.775	.214	74.1	78.6	67.0	11.6
8	.909	30 007	.801	.206	76.9	79.6	71.6	8.0
9	.927	.016	.824	.192	79.9	84.2	74.8	9.4
10	.928	.009	.822	.187	82.9	87.8	76.2	11.6
11	.912	.014	.807	.207	85.8	90.8	79.3	11.5
Noon.	.887	29.990	.785	.205	88.2	93.4	81.4	12.0
1	.855	.964	.751	.213	90.0	95.7	83.2	12.5
2	.822	.926	.725	.201	90.9	96.4	84.6	11.8
3	.800	.897	.698	.199	91 4	97.0	85.4	11.6
4	.787	.885	.694	.191	90.8	95.6	85.0	10.6
5	.784	.878	.686	.192	88.8	94.8	83.0	11.8
6	.795	.885	.687	.198	85.6	89.7	80.6	9.1
7	.807	.882	.695	.187	82.8	87.2	78.0	9.2
8	.833	.905	.716	.189	80.9	85.4	75.8	9.6
9	.857	.942	.740	.202	79.2	84.0	69.6	14.4
10	.866	.962	.755	.207	78.4	84.0	69.3	14.7
11	.866	.957	.757	.200	77.6	82.0	68.8	13.2

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1858.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew point.	Dry Bulb above Dew point.	Mean elastic force of Vapour.	Mean Weight of Va- pour in a Cubic foot of Air.	Additional weight of vapour required for complete saturation.	Mean degree of hu- midity, complete satu- ration being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid- night.	72.4	4.2	70.3	6.3	.0734	7.93	1.79	0.82
1	72.3	3.7	70.4	5.6	.736	8.00	.60	.83
2	72.0	3.5	70.2	5.3	.732	7.97	.49	.84
3	72.2	3.2	70.6	4.8	.741	8.07	.36	.86
4	71.4	3.1	69.8	4.7	.722	7.87	.31	.86
5	71.4	3.1	69.8	4.7	.722	.87	.31	.86
6	71.0	2.9	69.5	4.4	.715	.82	.19	.87
7	71.1	3.0	69.6	4.5	.717	.82	.25	.86
8	72.5	4.4	70.3	6.6	.734	.97	.89	.81
9	73.5	6.4	70.3	9.6	.734	.92	2.86	.74
10	73.8	9.1	69.2	13.7	.708	.59	4.20	.64
11	73.7	12.1	67.6	18.2	.672	.17	5.66	.56
Noon.	73.5	14.7	66.1	22.1	.640	6.79	6.97	.49
1	73.7	16.3	65.5	24.5	.628	.64	7.86	.46
2	73.5	17.4	64.8	26.1	.613	.48	8.41	.44
3	73.1	18.3	63.9	27.5	.595	.27	.83	.42
4	73.0	17.8	64.1	26.7	.599	.32	.52	.43
5	72.7	16.1	64.6	24.2	.609	.45	7.55	.46
6	73.4	12.2	67.3	18.3	.666	7.10	5.66	.56
7	73.3	9.5	68.5	14.3	.692	.44	4.31	.63
8	73.1	7.8	69.2	11.7	.708	.62	3.48	.69
9	72.8	6.4	69.6	9.6	.717	.74	2.82	.73
10	72.9	5.5	70.1	8.3	.719	.90	.41	.77
11	72.8	4.8	70.4	7.2	.736	.99	.08	.79

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1858.*

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
1	o 141.0	Inches. 0.22	S.	Cloudless till 6 P. M. cloudy afterwards with little rain and thunder and lightning at 8 P. M. Also foggy between Midnight and 7 A. M.
2	134.5	..	S. W. & S.	Scatd. $\searrow$ i and $\swarrow$ i till 3 A. M. cloudless till 4 P. M. Scatd. clouds afterwards with little drizzling at 11 P. M.
3	133.0	..	S. W. & N. W.	Cloudless till 7 A. M. Scatd. $\searrow$ i till 2 P. M. cloudless afterwards.
4	140.0	..	S. W. & W. & N. W.	Cloudless.
5	138.0	..	N. E. & S. W. & N. W.	Cloudless.
6	136.0	..	S. & N. W. & S. W.	Cloudless till 11 A. M. cloudy till 8 P. M. cloudless afterwards. Also foggy between 4 and 8 A. M.
7	<i>Sunday.</i>			
8	140.8	..	S. W. & N. & N. W.	Scatd. $\searrow$ i till 6 A. M. cloudless afterwards.
9	141.5	..	W. & S. & S. W.	Cloudless till 3 A. M. Scatd. $\searrow$ i and $\circ$ i till 3 P. M. cloudless afterwards.
10	138.0	..	S. W. & W.	Cloudless till 3 A. M. Scatd. clouds till 3 P. M. cloudless afterwards.
11	137.0	..	S. W. & W.	Cloudless.
12	138.0	..	S. & S. W. & W.	Cloudless till 6 A. M. Scatd. $\searrow$ i till 6 P. M. cloudless afterwards.
13	145.0	..	S. W. & S. & W.	Cloudless till 2 A. M. Scatd. $\searrow$ i till 9 A. M. cloudless afterwards.
14	<i>Sunday.</i>			
15	141.0	..	W. & S. & N.	Cloudless.
16	142.0	..	S. & S. W.	Cloudless.
17	143.0	..	S. & S. W.	Cloudless.
18	145.0	..	S. & S. W.	Cloudless till 5 A. M. Scatd. $\searrow$ i till 3 P. M. cloudless afterwards.
19	136.5	..	N. W. & W.	Cloudless till 4 P. M. Scatd. $\searrow$ i till 7 P. M. Scatd. clouds afterwards.
20	137.0	..	N. W. & S. W.	Cloudless till 7 A. M. Scatd. $\searrow$ i afterwards.
21	<i>Sunday.</i>			
22	137.0	..	S. & S. W.	Cloudless till 8 A. M. Scatd. $\searrow$ i and cloudless after short intervals till 9 P. M. cloudy with thunder and lightning afterwards.
23	136.5	..	S. & W.	Cloudy with thunder and lightning and drizzling at Midnight, cloudless till

$\searrow$ i Cirri,  $\searrow$ i cirro strati,  $\circ$ i cumuli,  $\sim$ i cumulo strati,  $\searrow$ i nimbi,  $-$ i strati,  $\searrow$ i cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1858.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing it rained.

Hour.	N.		N. E.		E.		S. E.		S.		S. W.		W.		N. W.		Calm.	Rain on.	Missed.
	Rain on.		Rain on.		Rain on.		Rain on.		Rain on.		Rain on.		Rain on.						
	No. of days.																		
Midnight.			1		2		1		17		1		2		3		1		
1			1		1		2		16		2		2		3		1		1
2			1		1		2		15		2		2		3		1		1
3			1		1				16		2		2		1		1		1
4			1		1				17		3		1		1		1		2
5					1				17		4		1		1		1		2
6					1				17		6		2		1		1		1
7	1	1	2		1				9		9		3		2		2		
8	2		3		1		1		5		10		4		1		1		
9	2		2				2		5		10		4		1		1		
10	2		2		1		2		8		8		3		1		1		
11	2				2		2		4		9		3		5				
Noon.		3			2		2		5		8		4		3				
1					2		1		5		12		4		3				
2		1	1				1		7		9		5		3				
3							1		8		8		7		3				
4									6		8		8		5				
5									7		9		6		5				
6	1								7		11		4		4				
7	1								9	1	9		5		3				
8	1				1				11	1	7		2		4				
9	1								13		7		2		3		1	1	
10	1								14		6		2		3			1	
11	1				1				15	1	5		2		3				







Put on in January 1907

